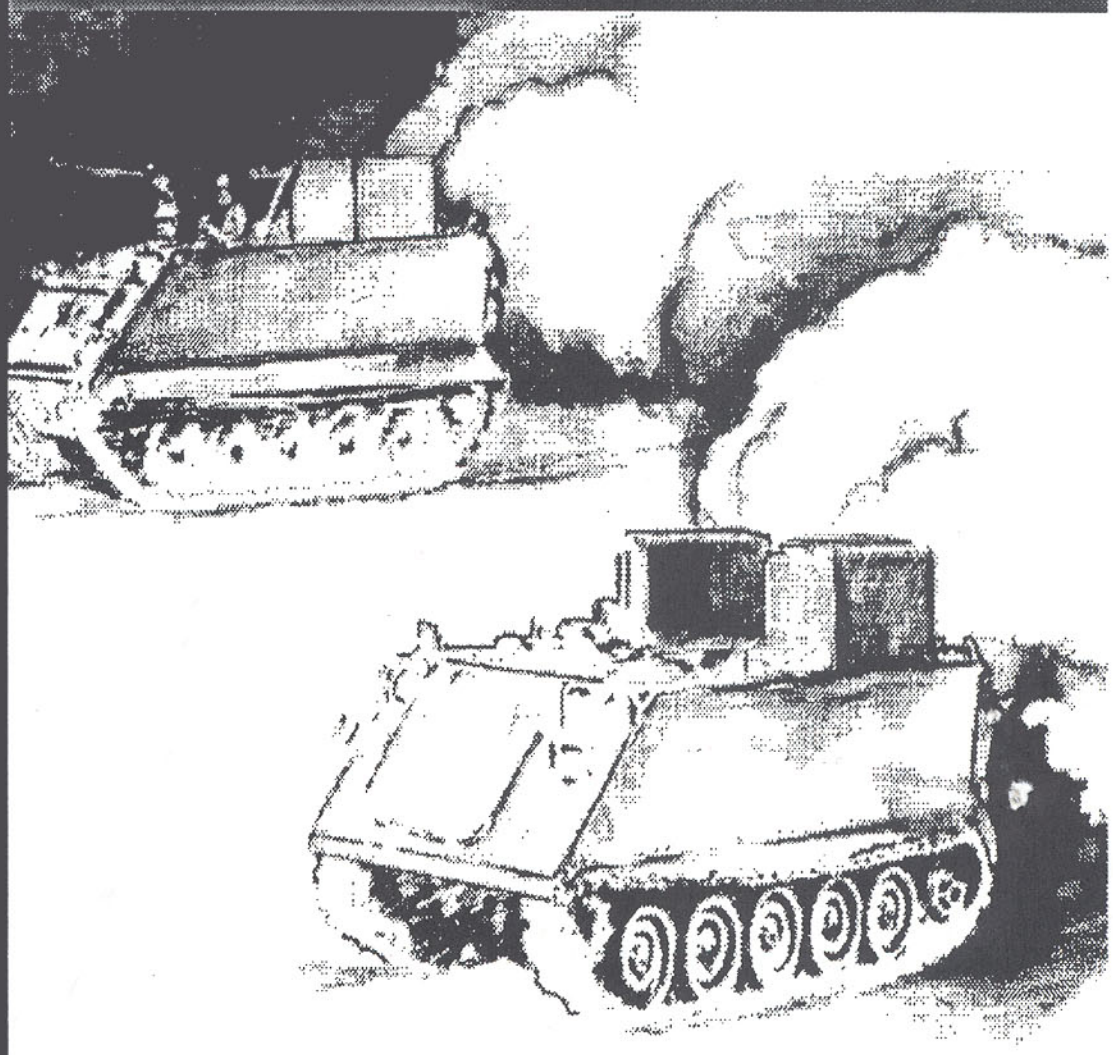
FM 3-101-1

SMOKE SQUAD/ PLATOON OPERATIONS

TACTICS, TECHNIQUES, and PROCEDURES



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SMOKE SQUAD/PLATOON OPERATIONS
--TACTICS, TECHNIQUES, AND PROCEDURES--

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PREFACE

This publication describes the tactics, techniques, and procedures (TTP) for mechanized and motorized smoke platoons and squads. This manual is oriented to the platoon and squad leader and complements FM 3-50, *Smoke Operations* and FM 3-101, *Chemical Staffs and Units*.

Smoke unit leaders must know the capabilities of their systems to fully use them in support of combat and other units. Smoke is a great combat multiplier, but it can also be a two-edged sword. Smoke provides commanders an advantage when it is properly employed. Smoke units can generate large and small area smoke screens to conceal friendly forces and deceive or blind enemy forces. The smoke unit leader must understand how to employ his systems and smoke on the battlefield to assist units in accomplishing their missions.

What should you get out of reading this manual? You should learn and understand the organization, mission, and function of smoke platoons and squads. This manual presents a thorough discussion of smoke unit TTP, particularly movement, and mobile and stationary smoke operations. Finally, this manual discusses how to integrate the smoke platoon into offensive, defensive, and other tactical operations.

By understanding the tactical and technical considerations of smoke employment and applying the appropriate TTP, smoke units can directly contribute to the protection of the force. This manual provides general guidance, but judgement must be used in application after considering each situation.

Safety is an integral part of performing any task to standard. Safety items are limited in this manual. Users must consult Soldier Training Products (STPs), Field Manuals (FMs), and Technical Manuals (TMs) for specific safety items for tasks covered.

This manual does not implement any international standardization agreements; however, the material within the manual is in accordance with related international agreements.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

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CHAPTER 1
SMOKE OPERATIONS OVERVIEW

Combat commanders refer to smoke as a two-edged sword. Smoke can assist a unit to succeed in battle or lead to its failure. There are many systems capable of providing smoke support: artillery, mortars, pots, grenades, aircraft, vehicles, and smoke generators. But only smoke generators are capable of providing a sustained, large-area smoke screen. This chapter will summarize the principles and applications of smoke in support of combat operations. FM 3-50, *Smoke Operations,* provides detailed guidance on the employment of smoke.

Smoke unit leaders must understand the enemy, how the Army fights, and how smoke functions as a countermeasure to sensors and enemy reconnaissance, intelligence, surveillance, and target acquisition (RISTA). Potential enemy forces, how the Army fights, and electro-optical systems/sensors are explained in great detail in other publications (See References).

This manual explains, in general terms, what the smoke unit leader needs to know about integrated smoke support (Chapter 1), explains the organizations and equipment available for generated smoke (Chapter 2), discusses planning and training necessary to engage smoke targets (Chapter 3). How to move and generate smoke is discussed in depth in Chapter 4. Chapters 5 - 6 outline the tactics, techniques and procedures for executing smoke support. Logistical planning considerations are found in Chapter 8.

HISTORICAL PERSPECTIVE

In September 1944 the 84th Smoke Generator Company was hastily recalled from its transportation duties to support the XX Corps crossing of the Moselle River near the town of Arnaville in eastern France. At the site of the crossing in the narrow valley of the Moselle, a railroad, a canal, and the river roughly parallel each other in a 500 yard belt (figure 1-1). East of the river lay a strip of open land beyond which were occupied by the enemy. On clear days the Germans had observation of the Arnaville area from 5 or 6 miles down (north) the river and from 3 or 4 miles up (west) the valley.

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In quest of surprise, the artillery plan stipulated that there would be no preparatory fire preceding the crossing. Instead, smoke from the 84th Smoke Generator Company was expected to conceal the crossing sites as dawn broke on 10 September. LTC Cottingham, 5th Division Chemical Officer, arranged for a meteorological study of the area. After a reconnaissance, LTC Cottingham and the company

commander selected a line of positions behind Hill 303, some 2,300 yards west of the crossing sites (Position 1 on the map). They expected the prevailing winds to carry the smoke down the valley and over the river. Generators were not placed closer to the crossing site because of the "unlikelihood" of wind change and the inexperience of the soldiers of the 84th under fire. Smoke observation points were setup on Hill 331 (south of Arnaville) and Hill 303.

At 0115 on 10 September troops of the 1st Battalion, 10th Infantry began loading onto boats near the bank of the Moselle. They encountered only scattered small arms fire as they advanced over the open terrain across the river until daybreak, when the first German artillery fire began to fall. By this time the 2d Battalion had begun its crossing, assisted by the smoke from the M2 generators which opened up at 0600. Under this concealment, the wounded were evacuated from the far shore and supplies and ammunition were sent across to the embattled troops. By 0800, after close fighting and heavy casualties, the two battalions had taken two hills. Suddenly at 1000 the wind shifted, causing the smoke to disperse. As the smoke dissipated, enemy artillery concentrated on the crossing sites, which were now exposed.

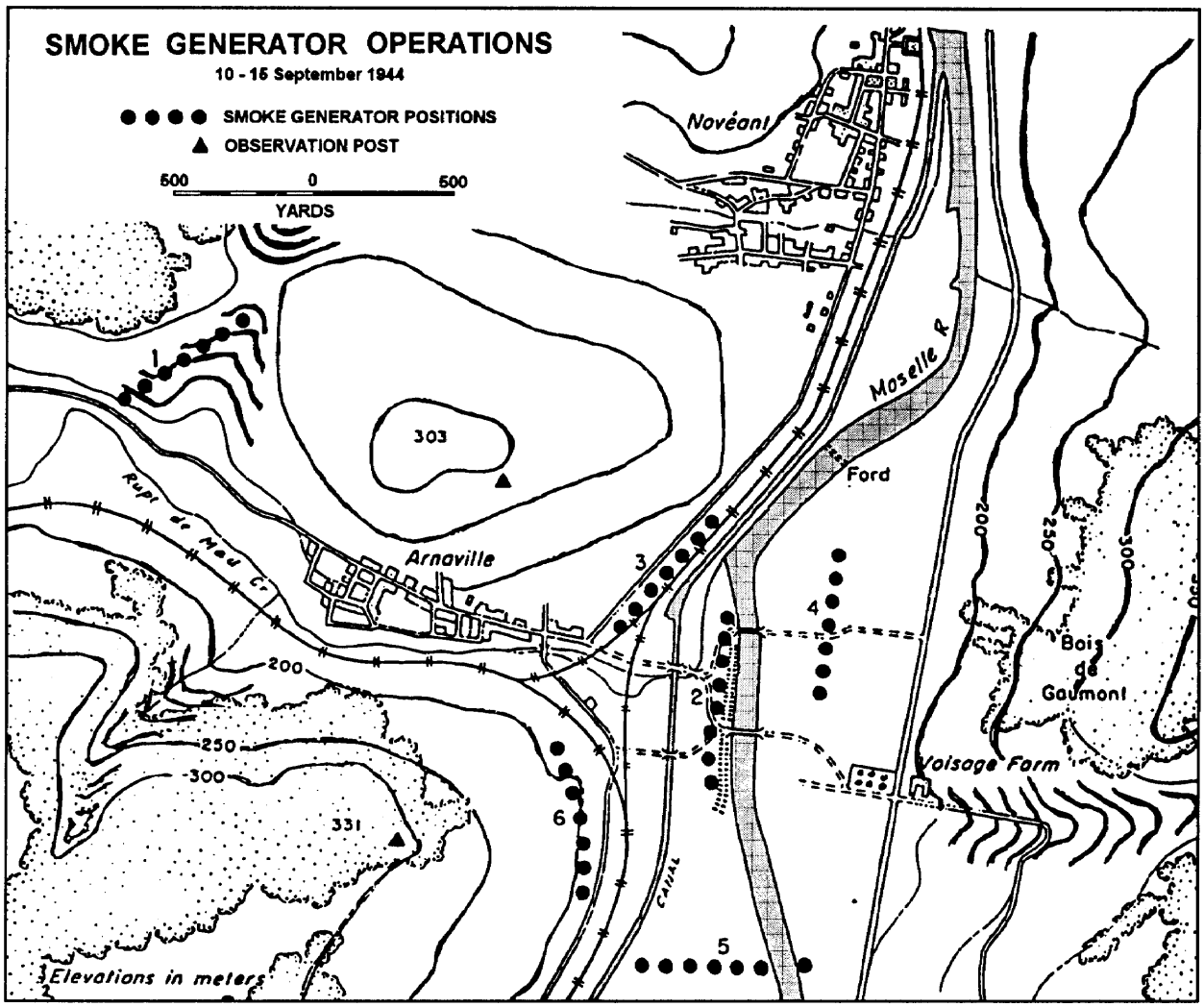


Figure 1-1. Smoke Generator Operations at Arnaville, September 1944

Within an hour LTC Cottingham and LT Young, of the 84th, moved four generators down to the site of an abandoned railroad embankment (Position 2 on the map). Smoke pots helped conceal the generators as they began to build effective smoke, and by 1200 the crossing was again concealed. The Assistant Division Commander, BG Warnock, informed the Division Chemical Officer, LTC Nottingham, to keep the generators running continuously. LT Lamb, the company executive officer, was across the river conducting a reconnaissance for new emplacements, while LT Young continued to direct operations on the near bank. At this point, COL Greene, XX Corps Chemical Officer, joined LTC Nottingham to inspect the operation. At the fog oil supply point west of Arnaville, a group under the 1SG's control organized details to move generators and fog oil to the crossing site.

LT Lamb increased the number of positions to ensure that an effective screen might be maintained, regardless of the wind direction. Position 3 paralleled a short stretch of the Arnaville-Noveant road and was later augmented by a jeep-mounted generator which patrolled the road on the lookout for any gaps in the coverage. That night eight crews crossed the Moselle, dug in their equipment, and were ready to start operations at Position 4 at dawn on 11 September. The new plan also called for emergency Positions 5 and 6, located south of Arnaville, but these were never needed. The 84th continued to make smoke during daylight hours from 11 to 15 September, when the 5th Division captured the dominating hill in the area on the far bank.

The Arnaville experience demonstrated that smoke generators could give effective support to an opposed river crossing. The experience also served notice to chemical troops that certain improvements were desirable. The lessons learned on leadership, detailed planning, logistical support, training and rehearsal carry their messages home to present day operations.

OPERATIONAL CONCEPT

Smoke and obscurants provide the commander with another means to defeat enemy forces and enhance force protection:

- Degrading the enemy's ability to see.
- Disrupting the enemy's ability to communicate.
- Concealing friendly forces.
- Deceiving the enemy.
- Providing a means to identify and signal.
- Degrading or defeating directed-energy weapons.
- Enhancing friendly weapon system effectiveness.

Smoke can render some electro-optical target acquisition and sighting devices ineffective; degrade others significantly; and cannot affect some at all. Visual obscurants are used to defeat the enemy's battlefield viewers, such as binoculars, weapon sights, night observation sights, and laser range finders. Bispectral obscurants are used to defeat the enemy's battlefield viewers and weapon guidance systems such as command line-of-sight or terminal horning systems on antitank and air defense missiles. When developed, multispectral obscurants will defeat the enemy's battlefield viewers; weapon guidance systems; radar systems; and high-energy, microwave-directed energy weapons.

DOCTRINAL CONSIDERATIONS

The primary factors that affect delivery of generated smoke onto a target are the weather and terrain conditions, the enemy, and command guidance.

WEATHER AND TERRAIN EFFECTS

Steering winds actually carry the smoke and determine its direction, speed, and downwind travel distance. Air stability affect the height, density, duration, and travel distance of smoke.

Since steering winds carry smoke, smoke usually follows the contours of the earth's surface. On flat, unbroken terrain and over water (open terrain), smoke streamers take longer to spread out and mix with other streamers. Obstructions, such as trees and buildings, tend to break up smoke streamers. The streamers may then re-form, cover a larger area, and create a more uniform cloud than over open terrain. Large hill masses and very rugged terrain cause strong cross currents of wind and tend to create holes and uneven dispersal of the smoke cloud. Appendix G provides detailed information on weather and terrain effects. See Appendix G and FM 3-6, *Field Behavior of NBC Agents (Including Smoke).*

THE THREAT

Wind direction determines from where you will engage a target. However, making smoke from the optimal location to engage the smoke target may increase the risk of engagement by enemy forces. The intelligence preparation of the battlefield process should identify potential enemy units/positions. Smoke platoon leaders must consider the increased risk of hostile engagement and plan for additional security or modify the plan for engaging the target.

COMMAND GUIDANCE

The supported unit commander must give planning guidance that answers the following questions:

- What do I want smoke and obscurants to accomplish? (Degrade target acquisition? Conceal the movement of my main attack? Aid in deception?)
- Where and for how long am I willing to sustain this smoke cloud? (Over my own position? Between my unit and the enemy? On the enemy?)
- How much restriction in my own mobility can I accept? (Visibility 50 meters or less? More? Curtain only?)
- How much restriction in my own target acquisition and engagement capabilities can I accept? (If I deny another's laser designators, I also deny mine, but my thermal sights are unaffected).
- When might on-call hasty or deliberate smoke benefit me? (Where does my decision support matrix indicate I may be exposed and need immediate smoke to obscure the enemy?)
- How will countersmoke help me? (If the enemy uses smoke, where and how should I retaliate with smoke to interfere with their synchronization?)

BATTLEFIELD APPLICATIONS OF SMOKE

Smoke has four battlefield applications that support combat operations: obscuring, screening, protecting, and marking.

Obscuring Smoke

Obscuring smoke is smoke delivered directly on or immediately in front of enemy positions to blind or degrade their vision both within and beyond their location. Use obscuring smoke to attack and defeat enemy target acquisition and guidance systems at their source.

Screening Smoke

Screening smoke is smoke delivered in areas between friendly and enemy forces or in friendly operational areas to degrade enemy ground or aerial observation or both. It also defeats or degrades enemy electro-optical (EO) systems. In general, use screening smoke to attack enemy target acquisition and guidance systems by placing smoke between the friendly unit and the sensors.

Protecting Smoke

Protecting smoke is smoke used to defeat enemy guidance systems or to attenuate energy weapons on the battlefield. Smoke and obscurants have the ability to reflect, refract, or absorb energy. In an active nuclear environment or when threat of nuclear weapon use is high, use protecting smoke to attenuate the thermal energy from nuclear detonations.

Marking Smoke

Marking smoke includes smoke used to mark targets, identify friendly positions, and provide for prearranged battlefield communications.

The smoke generator platoon engages targets to either obscure, screen, protect, or mark. The mission profiles are as numerous as there are tactical operations (e. g., support for a combat unit in movement to contact; support for a combat service support unit that is sustaining a deliberate attack).

OFFENSIVE OPERATIONS

Smoke employed during offensive operations generally favor the attacker, however this is dependent on the situation. During offensive operations, smoke is used to--

- Conceal maneuvering forces.
- Provide tactical surprise.
- Defeat enemy surveillance efforts.
- Support deception efforts.
- Enhance target acquisition.
- Conceal breaching operations.
- Allow the massing of forces.

Friendly smoke operations must increase friendly survivability and flexibility without degrading mobility and battle command. To achieve increased survivability and flexibility, use these guidelines:

- Use proper movement techniques and formations.
- Time smoke support with decision points.
- Use unobscured weapons to overwatch.
- Do not become silhouetted by your own smoke.
- Engage the enemy through the smoke.
- Plan for enemy countermeasures.
- Plan for additional maneuver time under smoke.
- Maintain situational awareness.
- Know where the enemy is.

DEFENSIVE OPERATIONS

Smoke is used during defensive operations to disrupt enemy attacks and allow the commander to seize the initiative. Smoke is integrated throughout the battlefield framework to disrupt the enemy's synchronization. Smoke is used to--

- Conceal disengaging and moving forces.
- Slow and disrupt enemy movement.
- Isolate attacking enemy echelons.
- Conceal engineers emplacing obstacles and preparing positions.

SMOKE EFFECTIVENESS

Smoke effectiveness is based upon the amount of energy the smoke absorbs, reflects or refracts. Therefore, effectiveness is a function of the source electromagnetic energy and the properties and concentration of the smoke. Currently we can not measure the degree of smoke effectiveness. Therefore, the effectiveness of smoke is estimated by qualitative means called the visibility criteria.

VISIBILITY CRITERIA

The qualitative estimate of effectiveness, or visibility criteria, depends upon the smoke's ability to obscure in the visual portion of the electromagnetic spectrum. Currently, simple optics comprise 99 percent of all battlefield optics. Therefore, an estimate of effectiveness based on the visual spectrum is a fairly good representation of total smoke effectiveness. However, as more sophisticated sensors become widely available, and because our future countermeasures include hi-spectral and multi-spectral obscuration, future technologies will provide a means to accurately quantify the effectiveness of obscurants.

Visibility criteria categories are smoke haze, smoke blanket, and smoke curtain.

Smoke Haze

A smoke haze is defined as a concentration of smoke that would allow an individual to identify a small tactical vehicle between 50 and 150 meters away, but no farther than 150 meters. It is not dense enough to disrupt friendly operations within the cloud.

Smoke Blanket

It is a concentration of smoke that would allow the identification of a small tactical vehicle from O to 50 meters but no farther. A smoke blanket may hamper operations of friendly troops by restricting movement and activity within the screen.

Smoke Curtain

A smoke curtain is a dense, vertical development of smoke. It is placed between friendly and enemy positions to prevent or degrade enemy ground observation of friendly positions. Since the smoke curtain is not placed directly on friendly troops, it will not hamper friendly operations.

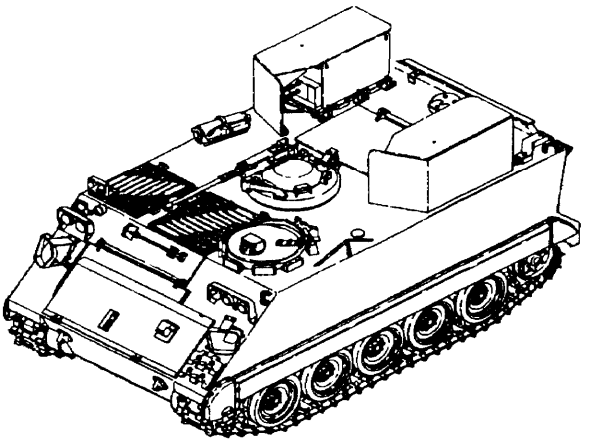
CONTROLLING SMOKE CONCENTRATION

The only portion of the smoke effectiveness equation that the smoke platoon can control is smoke concentration. Controlling the smoke concentration is dependent upon the distance from point source to point source (spacing), weather and terrain conditions. Chapter 2 gives general guidance for spacing smoke generators.

Making effective smoke with smoke generators is more of an art and less of a science, and smoke control officers need to recognize that they must adjust spacing when there are radical changes in weather or terrain conditions (e, g., when the wind speed increases by more than 5 km/hr or when the unit transitions from open to wooded terrain). Table 1-1 provides a summary of the favorable and unfavorable conditions for generator smoke.

Table 1-1. Summary of favorable and unfavorable conditions for smoke employment.

Factor	Curtain	Haze	Blanket	All
Wind >10 knots				U
<10 knots				MF
5 - 10 knots				F
Atmospheric stability				
Unstable	F	U	U	
Neutral	U	MF	MF	
Stable	U	F	F	
Humidity/Precipitation				
Low				U
Moderate				MF
High				F
Time of Day				
Heat of day	F	U	U	
Mid-morning	MF	MF	MF	
1 hr before EENT to 4 hrs after BMNT	U	F	F	
U = Unfavorable, MF = Moderately favorable, F = Favorable				



CHAPTER TWO
ORGANIZATIONS AND EQUIPMENT

The smoke platoon, mechanized or motorized, is the basic unit capable of generating large-area smoke screens. The smoke platoon can support ground maneuver forces or operate in the rear area providing support to fixed facilities. Mechanized smoke platoons can expect to operate in the forward combat area. They can expect rapid and frequent movements. Contact with enemy forces is probable. Motorized smoke units, depending on the type of unit they are supporting, also can operate in the forward combat area. However, motorized smoke will require more security from the supported unit when operating in the forward combat area. The smoke platoon also must operate in a manner that makes maximum use of its capability to generate large-area smoke screens.

SMOKE PLATOON ORGANIZATIONS

HEAVY DIVISION MECHANIZED SMOKE PLATOON

The heavy division smoke platoons are organized with a platoon headquarters, two smoke squads, and a support squad (figure 2-1).

Each smoke squad has three M1059 mechanized smoke carriers. The platoon headquarters consists of the platoon leader and platoon sergeant and one M1059. The platoon leader operates out of the headquarter's M1059. The platoon sergeant operates from one of the squad's M1059. The support squad has two 5-ton cargo trucks with tank and pump units mounted on them.

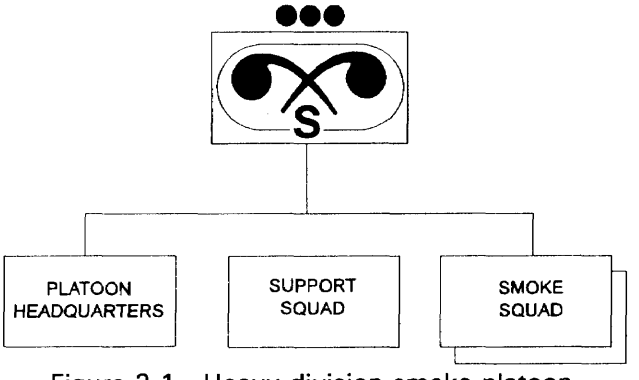


Figure 2-1. Heavy division smoke platoon.

SMOKE PLATOON ORGANIZATIONS 2-1
FUNCTIONS & RESPONSIBILITIES . 2-2
EQUIPMENT CAPABILITIES 2-3

CORPS MECHANIZED SMOKE PLATOON

The smoke platoon in a corps mechanized smoke company is organized identically to the heavy division smoke platoon.

CORPS MOTORIZED SMOKE PLATOON

The corps motorized smoke platoon is organized with a platoon headquarters and three smoke squads (figure 2-2). There are no support assets organic to the platoon; a separate support platoon is organized at company level. Each smoke squad is equipped with M157 smoke generators mounted on M1037 high-mobility multi-purpose wheeled vehicles (HMMWV).

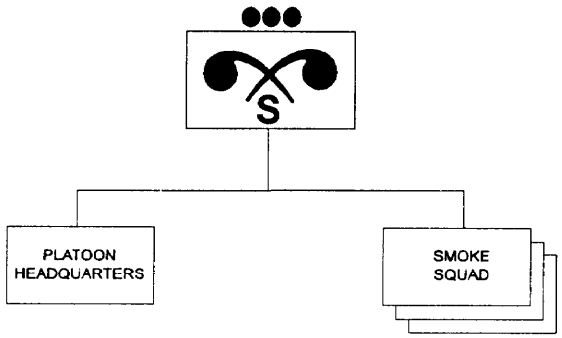


Figure 2-2. Motorized smoke platoon.

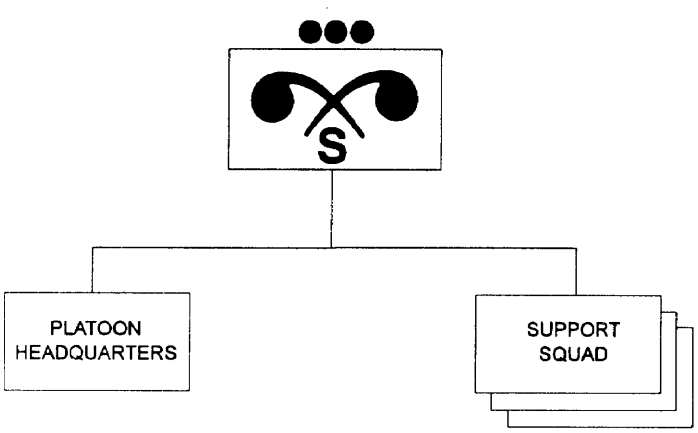


Figure 2-3. Support platoon, motorized smoke company.

SUPPORT PLATOON (CORPS MOTORIZED SMOKE COMPANY)

The corps motorized smoke company's support platoon is organized with a platoon headquarters and three support squads (figure 2-3). Each support squad is equipped with one 5-ton cargo truck with tank-and-pump units. Each platoon can haul 3,600-gallons of bulk petroleum product (fog oil, diesel, or MOGAS (motor gasoline) based on the commander's guidance). Each support squad is typically task-organized to a smoke platoon when the smoke platoons operate independently of the company.

FUNCTIONS AND RESPONSIBILITIES

PLATOON LEADER

The platoon leader is responsible to the commander for the overall discipline and training of his platoon and the maintenance of its equipment. He is responsible to the company commander or the supported unit for planning and executing successful tactical operations. He also must serve as an effective vehicle commander.

PLATOON SERGEANT

The platoon sergeant is second in command and is responsible to the platoon leader for maintenance, sustainment operations, and discipline. He also serves as a vehicle commander.

SQUAD LEADER

The squad leader has overall responsibility for the squad. While conducting smoke operations, the squad leader directs the movement of his squad, selects vehicle positions, and selects routes of movement. He also designates targets and issues fire commands. The squad leader communicates with the platoon leader and reacts to the platoon leader's commands. The squad leader coordinates and supervises the preparation of the squad to conduct operations.

SMOKE NCO/VEHICLE COMMANDER

The vehicle commander is responsible to the squad leader for the discipline and training of the crew, the maintenance of assigned equipment, the reporting of logistical needs, and the tactical employment of his vehicle. He is responsible for the mounted security of his vehicle. He briefs his crew, directs the movement of his vehicle, submits all reports, and supervises initial first aid and evacuation of wounded crew members. He is responsible for the generation of smoke and the firing of all weapons.

SMOKE GENERATOR OPERATOR

The smoke generator operator is responsible for the operation of the vehicles' smoke generator systems. He supervises the refueling of the fog oil tanks and the MOGAS cans on the vehicle. Additionally, he ensures that all equipment is tied down on the vehicle. He is also responsible for the maintenance on the smoke systems and assists the driver in maintaining the vehicle.

VEHICLE DRIVER

The driver is responsible for the maintenance of the vehicle and accountability of any vehicle equipment, to include commo systems. He drives the vehicle under the vehicle commander's control, using cover and concealment in accordance with the designated movement formation and technique. The driver assists the vehicle commander with maintaining mounted security.

EQUIPMENT CAPABILITIES

M1059 MECHANIZED SMOKE CARRIER

The M1059 mechanized smoke carrier consists of an M113A2 armored personnel carrier with an M157 smoke generator set. The M157 is mounted on the carrier and cannot be dismounted. The M157 smoke generator set consists of two M54 smoke generator assemblies, a fog oil tank, air compressor assembly, fog oil pump assembly, and a control panel assembly. The M54 smoke generator assembly is a gasoline-operated pulse jet engine that vaporizes fog oil. The fog oil tank, mounted inside the carrier, holds up to 120 gallons of fog oil. The tank also acts as the mount for the fog oil pump assembly. This assembly contains two in-line fog oil pumps. The fog oil is drawn from the fog oil tank and is pumped to the smoke generators. The air compressor assembly uses a pressure tank to store the compressed air needed for starting and purging the pulse jet engine. The control panel assembly contains the necessary switches, controls, and indicators for operating and monitoring each smoke generator, fog oil pump, and the air compressor.

The M1059 has a crew of three: vehicle commander, driver, and smoke generator operator. The vehicle commander also acts as the gunner for the M2 machinegun or MK19 40mm grenade machinegun. The M1059 has smoke grenade launchers which can provide self protective obscuration to enhance survivability.

MOTORIZED SMOKE CARRIER

The M157 motorized smoke carrier consists of the same components as the M1059, except they are mounted on an M1037 HMMWV chassis. The motorized smoke carrier has a typical crew of two and is normally equipped with an M60 machinegun. As with the M1059, the M157 smoke generator sets cannot be dismounted from the vehicle.

M3A4 SMOKE GENERATOR

The M3A4 pulse jet mechanical smoke generator is designed to generate large-area smoke screens using fog oil. The M3A4 operates on the same principle as the M54 smoke generator, except that the M3A4 can be dismounted. The M3A4 has nine assemblies; the engine, adjustable float, engine head, air pump, magneto-air pump, M4 fog oil pump, fuel tank, tool box, and frame. The engine is started by either a manually operated magneto-air pump or by releasing accumulated air. The engine is started by a manually operated air pump. The M3A4 can be carried by two soldiers. Fog oil is drawn from its own container by a fog oil pump mounted on the engine assembly. The M3A4 can only be operated when stationary.

COVERAGE TABLES

This section provides capabilities charts for mobile and stationary smoke and a planning guide for spacing/march intervals for controlling smoke effectiveness.

Mobile Smoke Capabilities

Table 2-1 provides the estimated ranges of smoke coverage for mobile smoke units. The assumptions used to calculate this data is:

- Smoke produced by 6 vehicle (12 generators).
- Smoke generators were M157.
- Vehicle are spaced 100 meters apart.
- Vehicles traveling one behind another at 15 km/hr.
- Platoon uses the racetrack technique with two different size orbits (500 and 1000 meters). The different orbits are shown under the column titled Platoon's Major Axis.
- Fog oil clouds only with a screening of the optical spectrum from 0.7 to 1.2 microns.

The range varies from low figures based on unstable weather and high wind speeds to high figures based on stable weather with moderate wind speeds. Use this table as a planning guide when assigning potential smoke targets to smoke platoons.

Table 2-1. Smoke platoon coverage - mobile.

Air Stability	Wind speed (kmph)	Type of Terrain	Platoon's Major Axis (m)	Max Width (m)		Max Downwind (m)	
				Blanket	Haze	Blanket	Haze
Unstable	9	Open	500	550	550	150	400
			1000	600	800	100	400
		Wooded	500	450	600	100	200
			1000	400	650	50	150
Neutral	9	Open	550	550	600	450	1450
			1000	950	1100	450	1400
		Wooded	500	500	600	350	800
			1000	750	1100	300	750
Neutral	14	Open	550	500	600	300	950
			1000	700	1000	200	1000
		Wooded	500	550	650	200	500
			1000	650	9000	150	500
Stable	9	Open	500	600	750	1450	3600
			1000	1200	1400	1300	3250
		Wooded	500	5650	750	950	3100
			1000	1150	1400	1100	2900
Stable	14	Open	550	500	600	1050	3150
			1000	1100	1300	1000	2700
		Wooded	500	650	750	700	2450
			1000	1050	1300	650	2250

Stationary Smoke Capabilities

Table 2-2 provides the estimated ranges of smoke coverage for stationary smoke units. Use this table as a planning guide when assigning potential smoke targets to smoke platoons. The assumptions used to calculate this data is:

- Smoke produced by 6 vehicle (12 generators).
- Smoke generators were M157.
- Fog oil clouds only with a screening of the optical spectrum from 0.7 to 1.2 microns.

The range varies from low figures based on unstable weather and high wind speeds to high figures based on stable weather with moderate wind speeds.

Table 2-2. Smoke platoon coverage - stationary.

Air Stability	Wind speed (kmph)	Type of Terrain	System Spacing (m)	Max Width (m)		Max Downwind (m)	
				Blanket	Haze	Blanket	Haze
Unstable	9	Open	25	150	200	250	750
			50	300	300	150	600
			75	350	450	150	350
			100	550	550	150	300
		Wooded	25	150	150	150	450
			50	300	300	150	600
			75	350	450	150	350
			100	550	550	150	300
Neutral	9	Open	25	150	250	900	2100
			50	300	300	500	1950
			75	350	450	350	1550
			100	550	550	350	1100
			150	800	800	350	850
			200	1050	1050	350	850
		Wooded	25	150	200	400	1400
			50	300	300	200	1000
			75	350	450	200	650
			100	550	550	200	500

Table 2-2. Smoke platoon coverage - stationary (continued).

Air Stability	Wind speed (kmph)	Type of Terrain	System Spacing (m)	Max Width (m)		Max Downwind (m)	
				Blanket	Haze	Blanket	Haze
Neutral	14	Open	25	150	200	650	1700
			50	300	300	300	1400
			75	350	450	300	900
			100	550	550	300	700
		Wooded	25	150	150	200	1050
			50	300	300	150	550
			75	350	350	150	400
			100	550	550	150	400
Neutral	25	Open	25	150	200	350	1200
			50	300	300	200	700
			75	350	450	200	500
			100	550	550	200	400
		Wooded	25	150	150	50	650
			50	300	300	50	300
			75	350	350	50	300
			100	550	550	50	300
Stable	9	Open	25	200	300	2300	5100
			50	300	400	1800	4800
			75	450	500	1200	4300
			100	550	650	900	3700
			150	800	900	900	2500
			200	1050	1150	900	2100
		Wooded	25	150	300	1900	4700
			50	300	400	1100	4300
			75	350	450	700	3700
			100	550	550	700	1700
			150	800	800	700	1700
			200	1050	1050	700	1600

Table 2-2. Smoke platoon coverage - stationary (continued).

Stable	14	Open	25	200	300	1900	4400
			50	300	400	1300	4100
			75	400	500	800	3500
			100	550	550	700	2800
			150	800	900	700	1800
			200	1050	1050	700	1700
		Wooded	25	150	250	1400	3700
			50	300	300	600	3300
			75	350	450	500	2400
			100	550	550	500	1700
			150	800	800	500	1300
			200	1050	1050	500	1300

Smoke Generator Calculations

Step 1. Determine wind speed, air stability, and type terrain. Determine visibility requirement. Reading left to right, determine the smoke generator position spacing.

Step 2. Determine desired smoke line length. Divide the smoke line length by the spacing requirement. Add one. This figure represents the number of smoke positions needed.

Step 3. Reading left to right, determine the distance in meters smoke line from target area.

Table 2-3. Smoke generator spacing guide.

Wind speed		Air Stability	Terrain	Position Spacing (meters)		Distance (meters) smoke line from target area
kmph	knots			Haze	Blanket	
1-14	1-7	Stable/Neutral	Over water	90	45	450
			Open	110	55	550
			Wooded	140	70	700
		Unstable	Over water	70	35	350
15-25	8-13		Open	90	45	450
		Stable/Neutral	Wooded	130	65	650
		Unstable	Over water	50	25	250
26-32	14-17		Open	70	35	350
		Stable/Neutral	Wooded	110	55	550
		Unstable	Over water	40	20	200
			Open	50	25	250
			Wooded	90	45	450

Smoke Generator Class III Consumption Tables

Use Tables 2-4 and 2-5 to determine fog oil and MOGAS consumption for smoke generators. These tables are based on normal consumption of a smoke generator platoon running all generators simultaneously. When a crew operates a single M3A4 or M157 smoke generator, multiply the planning figure by 0.5.

Table 2-4. Smoke generator fog oil consumption (in 55-gallon drums).

	Hours														
Generators	1	2	3	4	5	6	7	8	9	10	11	12	24	36	48
1	1	2	3	4	5	6	7	8	9	10	11	12	24	36	48
6	6	12	18	24	30	36	42	48	54	60	66	72	144	216	288
8	8	16	24	32	40	48	56	64	72	80	88	96	192	288	384
12	12	24	36	48	60	72	84	96	108	120	132	144	288	432	576
18	18	36	54	72	90	108	126	144	162	180	198	216	432	648	864
24	24	48	72	96	120	144	168	192	216	240	264	288	576	864	1152
36	36	72	108	144	180	216	252	288	324	360	396	432	864	1296	1728
48	48	96	144	192	240	288	336	384	432	480	528	576	1152	1728	2304

Table 2-5. Smoke generator mogas consumption (in gallons).

	Hours														
Generators	1	2	3	4	5	6	7	8	9	10	11	12	24	36	48
1	3	6	9	12	15	18	21	24	27	30	33	36	72	108	144
6	18	36	54	72	90	108	126	144	162	180	198	216	432	648	864
8	24	48	72	96	120	144	168	192	216	240	264	288	576	864	1152
12	36	72	108	144	180	216	252	288	324	360	396	432	864	1296	1728
18	54	108	162	216	270	324	378	432	486	540	594	648	1296	1944	2592
24	72	144	216	288	360	432	504	596	648	720	792	864	1728	2592	3436
36	108	216	324	432	540	648	756	864	972	1080	1188	1296	2592	3888	5184
48	144	288	432	576	720	864	1008	1152	1296	1440	1584	1728	3456	5184	6912

Smoke Pot Planning Tables

Table 2-6 is the spacing guide for smoke pots. When using Table 2-6 to determine actual spacing requirements, round up all answers (decimals) to the next larger whole number. To use this table, you must know the length of the target area in meters and the spacing between pots in meters, plus how long the target must be smoked. Enter the table from the left-smoke time. Locate the spacing between pots at the top of the table. Under the spacing, find your target length. The cell where this column and the smoke time row intersect contains the number of pots needed.

Table 2-6. Spacing guide.

Number of Smoke Pots Needed to Produce Smoke for a Mission												
Spacing	15m			20m			25m			30m		
Line Length / Smoke Time	100 m	500 m	1000 m	100 m	500 m	1000 m	100 m	500 m	1000 m	100 m	500 m	1000 m
15 min	12	51	102	9	13	77	8	32	62	6	27	51
30 min	24	102	204	18	78	153	15	63	123	12	48	102
1 hr	48	204	612	36	156	306	30	126	246	24	108	204
3 hr	144	612	1224	108	468	918	90	378	738	72	324	612

CHAPTER THREE
BATTLE COMMAND

OVERVIEW

Battle command is the art of battle decision making, leading, and motivating soldiers and their organizations to accomplish the mission. It includes the responsibility for health, welfare, training, and discipline of assigned personnel. The unique character of battle command of military operations is that it must be effective under extraordinary stress of battle -- in confusing situations and under emotional stress caused by personnel and materiel losses.

LEADING IN COMBAT

The primary duty of a leader is mission accomplishment. Leadership is the process of influencing others to accomplish the mission by providing purpose, direction, and motivation in preparing for and executing combat operations. Leadership is based on knowledge of men, equipment, and tactics.

A leader must be technically proficient in the use of all of his equipment, able to determine the military importance of terrain, and understand the capabilities of the enemy. He also must be tactically and technically proficient in the employment of his men and equipment in conjunction with the terrain and weather to accomplish his mission. At platoon and squad level, leadership by example is key. Leaders must--

- Set a positive example.
- Lead from where he can control all elements, either physically or by radio.
- Move to critical locations to influence the action personally when necessary.
- Make sound, quick decisions.
- Execute decisions forcefully.

The battlefield is a stressful and fatiguing environment. The first days of battle can be particularly hard as leaders and soldiers adapt to the reality of fighting. The platoon and squad must be prepared to operate 24 hours a day. Leaders make every effort to minimize the effects of stress and fatigue. Soldiers who are well-trained and confident react better during stress and fatigue. Standing Operating Procedures (SOPS) that are

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mastered help men and units endure. Sleep and rest are critical aspects of maintaining individual and unit proficiency and must occur during lulls in operations. Rest must be accomplished while maintaining security.

Leaders begin rest periods (catnaps or longer) before fatigue becomes debilitating. Soldiers should not go longer than 24 hours without sleep. Leaders should recognize signs of fatigue and act to diminish it. For continuous operations without prolonged sleep, leaders should aim for four hours uninterrupted hours of sleep and "cat naps" when available, to prevent fatigue.

Soldiers should rest or sleep when possible while a buddy remains awake. In tasks requiring alertness (surveillance, communication), personnel are rotated frequently. If possible, after prolonged periods of minimal rest or sleep (2 to 4 days), a long period of uninterrupted sleep (12 to 24 hours) is needed. If awakened ahead of time, a period of reduced responsiveness can be expected.

BATTLE COMMAND

The battlefield is characterized by fluid, nonlinear chaotic situations. Confusion is further aggravated by degraded communications. Achieving tactical objectives in this environment largely depends on a clear command and control process.

The goals of mission-oriented command and control are to--

- Allow units to function when out of contact with higher headquarters or time-space considerations preclude centralized decisions.
- Decentralize decision making during execution of a centralized concept of operation, which maintains focus on mission accomplishment.
- Provide maximum freedom of action so subordinates can act in a timely manner within the framework of higher headquarters concept.

In order for mission-oriented command and control to work, there must be a focused effort understood by the entire force. This is gained by unity of command using the concept of the operation.

Requirements for mission-oriented command and control are:

- The leaders share a basic understanding of how our Army fights. Army doctrine emphasizes the application of the principles of war to generate combat power at the decisive place and time. Command understanding of the principles enhances their proper application.
- The estimate of the situation is the U.S. Army's method of tactical decision making. Understanding the estimate provides leaders the ability to reach sound decisions based on the best information available.
- Leaders must be tactically and technically proficient. They must understand and use the common doctrinal language and display sound judgment.
- There must be trust between seniors and subordinates.

TROOP LEADING PROCEDURES

The troop-leading procedures (TLP) are the processes by which a leader receives, plans, and executes a mission. Troop leading is the mental process a leader goes through to prepare his unit to accomplish a tactical mission. Troop leading requires time: the more time, the greater the leader's ability to plam and prepare in depth; the less time, the more reliance the leader must place on SOPs. Leaders must use the procedures outlined, if only in an abbreviated form, to insure that their element and soldiers understand and are prepared for mission accomplishment.

The process is a continuous cycle. It begins when the unit is alerted for a mission. It starts all over again when a new mission is received. In combat, there may not be available time to go through each step in detail. However, a good leader will habitually check each step off in his mind or refer to a leader's notebook/checklist to ensure that he has not forgotten anything. Troop leading must be an instinctive and a familiar way of operating. The troop-leading steps and their sequence are not rigid. They are modified to meet the mission, situation, and available time. Some steps are conducted concurrently while others are continuous throughout the operation.

Troop Leading Procedures

1. Receive the mission.
2. Issue a warning order.
3. Make a tentative plan.
   a. Estimate the situation.
      - Step 1 - Detailed mission analysis
      - Step 2 - Situation and courses of action
        -- Terrain and weather (OCOKA)
        -- Enemy situation (enemy courses of action)
        -- Own situation (troops and time available)
        -- Courses of action (friendly)
      - Step 3 - Analyze courses of action - war game
      - Step 4 - Compare courses of action
      - Step 5 - Decision
   b. Expand selected course of action into a tentative plan.
4. Start the movement.
5. Reconnoiter.
6. Complete the plan.
7. Issue the plan.
8. Supervise.

Step 1: Receive The Mission. A mission maybe received in a warning order, operations order (OPORD), or as a fragmentary order (FRAGO). As soon as the leader receives the mission, he analyzes it using METT-T (mission, enemy, terrain, troops, and time). If the leader does not fully understand the mission, he seeks additional guidance. The platoon leader must determine the time available and use only one-third of it to prepare his plan. At least two-thirds of the available time should be used for preparation. The leader should use the backward planning technique. Determine when the mission starts and plan back from there, ensuring there is enough time allocated for each task/step. Below is an example:

0720: Ready time
0715: Check assembly area
0600: Inspect squad/rehearse
0505: Issue order to squad
0500: Complete squad order
0405: Reconnoiter with platoon leader/receive order
0350: Issue warning order to squad

Step 2: Issue a Warning Order. Initial instructions are usually in an warning order. In the warning order, the leader provides enough information for his unit to begin preparations for the mission. The platoon leader issues the warning order to the platoon sergeant and the squad leaders. Each squad leader in turn issues a warning order to his squad. Unit SOP should prescribe the actions for all soldiers to take once a warning order is received; for example: PMCS (preventive maintenance checks and services) vehicle, check water and fuel cans, check ammunition and ration levels, and so forth. The warning order should contain, at a minimum --

- Mission/nature of the operation.
- Who is participating in the operation.
- Time of the operation.
- General location of the operation.
- Time and place the order will be issued.
- Any special instructions.

Step 3: Make a Tentative Plan. Based on METT-T, the leader develops a tentative plan for supporting the assigned mission. The tentative plan gives the leader a starting point from which to coordinate, reconnoiter, organize, and move. During his planning, the leader takes into account the following--

- What is the platoon's mission? (Example: We must create a smoke screen to conceal the movement to objective Red or we must establish a smoke line NLT 0400).

- What enemy troops oppose us? (What size units and where are they? What type weapons do they have?)

- How can we use the terrain to our advantage? (Analyze the terrain using OCOKA - observation and fields of fire, cover and concealment, obstacles, key terrain, and avenues of approach).

- What is the availability of troops for this operation? (What is the number of systems fully operational? Is there a shortage of personnel?)

- How much time is available for planning and preparation and how long do we need to smoke?

The leader considers each of these factors and compares alternatives. From his analysis, he draws a conclusion that forms the basis for his plan of action, which will become his order.

Step 4: Start Necessary Movement. During steps 3 through 8, the platoon leader may be forward completing his plan. If there is a distance between the platoon and where the mission must be conducted, the platoon sergeant may bring the platoon forward to save time. This particular step may be omitted, occur in a different sequence, or be done concurrently with another step.

Step 5: Reconnoiter. If time allows, the leader makes a personal reconnaissance to verify his terrain analysis, adjust his plan, confirm the usability of routes, and time any critical movements. When time does not allow, the leader must make a map reconnaissance.

Step 6: Complete the Plan. Based on the reconnaissance, the leader completes his plan using the five paragraph field order as his guide.

Step 7: Issue the Complete Order. The leader issues his order orally following the five-paragraph field order format. If possible the order should be issued from a vantage point overlooking the terrain the unit will be operating on. If that is not possible, the leader should use a terrain map (sand table) or sketch to help explain his plan. At the end of the order, each subordinate leader should copy the necessary graphics onto his map. If time allows, the platoon leader should conduct his own rehearsal.

Step 8: Supervise. After the order is issued, leaders direct the preparation. The platoon must conduct rehearsals and backbriefs. The platoon leader should attend the supported unit's rehearsal.

ESSENTIAL ELEMENTS OF A SMOKE PLAN

No matter how much planning time is available, there are essential elements of a smoke plan. These essential elements provide the level of planning detail required for the smoke operation to support the unit's scheme of maneuver and the commander's intent for the mission.

INTENT

The commander's intent for using smoke must be clearly identified and understood. The smoke planner must answer this question: What does the commander want the smoke to accomplish? The commander must provide this information in his initial planning guidance.

MISSION STATEMENT

The mission statement is a clear, concise statement of who, what, when, where, and why smoke will be used to support the operation. The type of smoke desired is included in the mission statement: smoke haze, smoke blanket, visibility of no less than 50 meters, and so forth.

CONTROL MEASURES

The exact locations that must be smoked are identified as smoke targets and objectives. A smoke target is a specific point on the ground that must be obscured, such as a bridge or fixed facility. Smoke objectives are large areas that must be obscured. Other control measures assist the smoke unit leader in controlling the placement of smoke on the battlefield: primary smoke line, alternate smoke line, contact point, passage point, route, rally point, and so forth. The platoon leader acquires a majority of this data from the leader's recon. Graphics of the supported unit's operation are also added to the platoon's graphics.

SMOKE CONTROL

The plan must identify the responsible individual(s) for triggering the execution of indirect smoke fires and the starting/stopping of generated smoke. The use of codewords is a preferred method for quickly disseminating instructions: *ROSE* = start smoke, *VERMONT* = stop smoke.

INTEGRATION OF SMOKE ASSETS

Smoke generator units are limited by two key factors: wind direction and a finite number of platforms. The employment of all smoke assets must be considered and an integrated plan developed. Indirect fire systems may be used to build the initial screen or blind enemy gunners while the smoke unit maneuvers into position. Vehicle engine exhaust smoke system (VEESS) use complements smoke generator operations during maneuver.

TIMING/SYNCHRONIZATION

The physical placement of smoke on the battlefield is not an instantaneous event. For projected smoke munitions, the time to process the fire mission, time of flight of the munition, the time to build an effective smoke screen, and the average burning time are considered in the plan. When planning the employment of smoke generators, consider the time required to move and establish the smoke line and the time for the smoke to develop within the desired area (based on wind speed). The movement speed of the task force or the closure speed of the enemy are other critical factors when synchronizing the smoke with the maneuver plan.

SECURITY OF THE SMOKE ELEMENT

When smoke generator units are actively producing smoke, they are extremely vulnerable to enemy air, ground, and artillery attacks. Depending on the positioning of the smoke unit, the supported unit should provide a security element for protection.

ADJACENT UNIT COORDINATION

Routes, contact points, and passage points are designated when the smoke unit must pass through another unit to occupy a smoke position. The smoke platoon must coordinate it movement on the battlefield. Coordination between the two units will prevent fratricide. The platoon leader should also coordinate with units who may be affected

by the smoke as it crosses over units boundaries.

LOGISTICAL CONSIDERATIONS

The plan must clearly identify the command/support relationship. The command/support relationship will dictate what the type of logistical support the smoke platoon can expect from the supported unit. The availability and sustainment of required and on-hand smoke material (fog oil, smoke pots, for example) is a primary limiting factor of any planned smoke operation.

COMMUNICATIONS

Squads and platoons must be able to effectively communicate to control and coordinate movement, send and receive instructions, request logistical or fire support, and gather and distribute information. There are many ways to communicate. The primary types of communications available at platoon level are messenger, wire, visual, sound, and radio, A backup means of communicating should always be planned in case the primary method fails. The means of communication chosen depends on the situation and available communications assets.

MESSENGER

Using a messenger is the most secure means of communicating and usually the best way to send long messages that cannot be delivered personally by a commander. It is the slowest means of sending information and is vulnerable should the messenger be delayed, captured, or killed. Messages sent by a messenger should be clear, concise, and complete. No unnecessary words should be used. If there is a chance the messenger might be captured, the message should be encoded, using the operational code in the SOI.

WIRE

Use wire communications whenever the platoon expects to stay in one place more than an hour. When possible, tie the whole platoon together by a wire net. The wire net consists of field wire laid among vehicles. There are several ways the platoon wire net can be set up, depending on whether the platoon is totally mounted or partially dismounted.

Mounted

When mounted, lay the wire from vehicle to vehicle. On the M1059, connect the wire to the terminals on the right rear of each vehicle. Because TA-1 telephones (which are sound powered) are being used, one strand of the wire must be cut, the insulation stripped away, and the wire ends attached to the wire terminal connectors on the right rear of the M1059. Connect the TA-1 to the terminals on the inside of the vehicle by using a short length of wire.

Dismounted

The platoon occupies a position and has dismounted positions/OPs. The wire net would be made by connecting all the platoon vehicle and dismounted positions.

In mechanized units, the dismount positions will use TA-ls, one strand of wire must be cut, the insulation stripped back, and the wires attached to the binding posts of the TA-1 to connect the dismounted positions to the wire net Because one strand of the wire must be cut, the wire net is in series. This means that if the wire is broken or disconnected, the whole wire net will cease to function.

- Connect vehicle crews to the wire net by stripping the insulation from the end of the strands of wire and inserting the wire ends into the binding posts of the AM/1780 audio frequency amplifier.

- T-Splice this wire into the wire net by cutting one strand of the wire, stripping back the insulation from the ends, and splicing the ends to the wire from the AM/1780. Use this method for vehicles that connect to the wire net between the ends of the wire net. If the wire net starts at a M1059, connect the wire to the binding posts of the AM/1780. The AM/1780 must be turned on while in the wire net. If it is turned off, the wire net will not work. Wire should be tied off to the hull to prevent damage to the AM/1780 if the vehicle moves.

NOTE: A communications check must be made to ensure the wire net works. The C-2298 control box must be set in the ALL position. Set the AM/1780 for normal operations. If a fighting vehicle crew cannot communicate with the rest of the teams, reverse the strands of wire in the AM/1780 binding posts and make another check.

For motorized units, lay the wire between the vehicles and the dismounted positions. To do this, the telephones must be both in the vehicle and the dismounted positions.

After wire has been laid to all vehicles, it should be buried several inches deep or strung overhead. This prevents vehicles damaging the wire or soldiers tripping over it. Before a vehicle moves more than a few feet, the vehicle commander should ensure the wire is disconnected.

When a position is vacated, recover the wire, unless impractical due to enemy activity.

VISUAL

Visual signals are the most common means of communicating in squads and platoons. Arm-and-hand signals, flags, flashlights, and pyrotechnics allow rapid transmission of messages and instructions. Disadvantages in using visual signals is that smoke may obscure these signals during smoke operations. The enemy may also see and understand the visual signals. But if the terrain is used properly, there is less chance these signals will be seen by the enemy. Another consideration is visual signals require visual contact between the sender and the receiver, and often the signals are misunderstood. To overcome this, every man must be able to send, receive, and understand messages using visual signals. Squads and platoons must practice these signals every chance they get.

Arm-and-Hand Signals

Arm-and-hand signals are the basic way of communicating within squads and platoons when visibility is good. They are essential during periods of radio-listening silence.

Flags

Flag signals are easier to see and understand at greater distances than arm-and-hand signals. Each vehicle should have a set of three flags--red, green, and yellow. They may be used to--

- Control movement. Flags serve as an extension of arm-and-hand signals.
- Mark vehicle positions. For example, a quartering party member uses flags in an assembly area to mark vehicle positions.
- Identify disabled vehicles.
- Warn friendly elements of an advancing enemy. For example, an observation point (OP) member uses a flag to signal a platoon to move to its fighting position.

Pyrotechnics

Pyrotechnics can be used as signals any time of the day. In daylight and in conditions of limited visibility, such as fog, rain, or falling snow, they are less effective. Pyrotechnic signals are usually prescribed in the SOI. Squads and platoons cannot improvise and use their own pyrotechnic signals. They may conflict with the SOI and confuse other units. Pyrotechnic messages must be confirmed as soon as possible because the originator cannot be sure the signal was seen and understood. Supplying pyrotechnics is also a logistical consideration.

CAUTION
PYROTECHNIC SIGNALS ARE EASY FOR THE ENEMY TO INTERCEPT AND IMITATE.

Other Signals

Mirrors, headlights, and panels are other means of visual communication but are difficult to use on the move. See FM 21-60 for a complete list of visual signals.

SOUND

Sound communications include such simple devices as whistles, horns, gongs, and explosives. Sound signals are used mainly to attract attention, transmit prearranged messages, and spread alarms. Sound signals work, but only for short distances. Battle noises, specifically smoke generators, cut down the range and reliability of sound signals. They are also open to enemy interception, so their use maybe restricted for security. To avoid any misunderstanding, sound signals must be simple. They are usually prescribed by unit SOP and the SOI.

RADIO

Enemy forces may have an extensive radio intercept capability. Use radios within the platoon only when messages cannot adequately be sent by other means. If a radio transmission is intercepted, the enemy usually can find out where a unit is and what it is doing. When radios are used, keep transmissions short and to the point. The sender must know what he wants to say before he transmits. This helps keep messages short and the radio net open. It also reduces vulnerability to enemy intercept. FM communications require proper authentication procedures. When using SINCGARS radios, the platoon must load “hop” and “lockout” sets of the supported unit.

A platoon may have the following radio equipment :

- AN/VRC-91. The AN/VRC-91 is a long-range vehicle radio with dual-net capability. One of the radios is dismountable and has accessories for man-pack configuration. The platoon leader’s and platoon sergeant’s vehicle have the AN/VRC-91.
- AN/VRC-87. The AN/VRC-87 is a vehicle-mounted, short-range, single-net radio.
- AN/PRC-126. The platoon is authorized one AN/PRC- 126 squad radio per vehicle.

NOTE: Radio discipline must be strictly enforced because of the number of radios on the platoon net. To neutralize the enemy’s intercept and radio direction-finder capability and to make command and control easier, make only necessary transmissions.

For mechanized units during mounted movement, soldiers should wear the CVC helmet in place of the soldier’s helmet. Before the soldier dismounts, he hangs his CVC helmet on a hook by his intercom system control box. Soldiers using headset wear their helmet over the headset. Before he dismounts, he removes the headset and places it on a hook by his control box. This is done to prevent soldiers tripping over a CVC cord or headset cord or

damaging the equipment. Tape the CVC quick-disconnect to the spaghetti cord. It is disastrous for a vehicle commander to lose communications with his driver.

Radiotelephone Procedures

Certain commonly used procedural words (prowords) have distinct meanings. They shorten the time used in voice communication and avoid confusion. They are used when talking on the radio. Table 3-1 lists the most frequently used prowords.

The following rules apply for radio and wire communications:

- Listen and think before transmitting (sending).
- Make the message short and clear.
- Speak clearly, slowly, and in natural phrases; pronounce each word distinctly. If the receiving operator must write, allow him enough time for writing.
- If jammed (using-radio), use the methods listed in the discussion on communications security (below).
- When using the radio or wire, personnel should not waste time. Send the message and get off the net.

OVER	"This is the end of my transmission to you and a response is necessary. Go ahead, transmit."
SAY AGAIN	"Say again all of your last transmission."
CORRECTION	"An error has been made in this transmission. Transmission will continue with the last word correctly transmitted."
I SAY AGAIN	"I am repeating transmission, or portion indicated."
ROGER	"I have received your last transmission satisfactorily."
WILCO	"I have received your message, understand it, and will comply."
OUT	"This is the end of my transmission to you and no answer is required or expected."

Table 3-1. Frequently used radio prowords.

COMMUNICATIONS SECURITY

Communications security (COMSEC) denies or delays unauthorized persons from gaining valuable telecommunications information. COMSEC includes--

- Using correct authentication procedures to ensure the other communicating station is friendly.
- Using only approved codes.
- Enforcing net discipline and radiotelephone procedures. All stations operating in a net must use authorized call signs and prowords and limit transmissions to necessary official traffic.
- Restricting the use of radio transmitters, while monitoring radio receivers (radio-listening silence).
- Using terrain to mask radio communication from the enemy (place a hill or other terrain feature between the transmitter and the enemy).
- Using directional antennas when possible. (See FM 24-33.)
- Using low-power when possible, especially when smoke points are in close proximity to each other.
- Keeping antennas tied down.

Electronic counter-countermeasures (ECCM) prevent or overcome enemy electronic warfare. ECCM taken by a platoon consist of mainly using proper signal security and anti-jamming techniques.

Radio operators must use anti-jamming procedures to reduce enemy jamming efforts. They are recognition, continued operations, and reporting.

RECOGNITION

When an operator's radio indicates interference, he first tries to find what is causing the interference. He should not immediately assume jamming, because jamming signs often are like other types of interference. Removal of the receiver antenna can help determine if the interference is being produced internally by the receiver. If interference decreases when the antenna is removed, the problem is jamming.

CONTINUED OPERATIONS

Once jamming has been identified, normal radio operations should be continued so the enemy cannot determine the jamming effects. The rule is: during jamming, continue operation unless ordered to shut down or switch to an alternate frequency.

REPORTING

All operators must report jamming to their next higher headquarters by another means of communications; for example, wire or messenger. At a minimum, the meaconing, intrusion, jamming, and interference (MIJI) report contains--

- Date and time of jamming.
- Frequencies affected.
- Type and strength of jamming signal.
- Designation of the unit making the report.

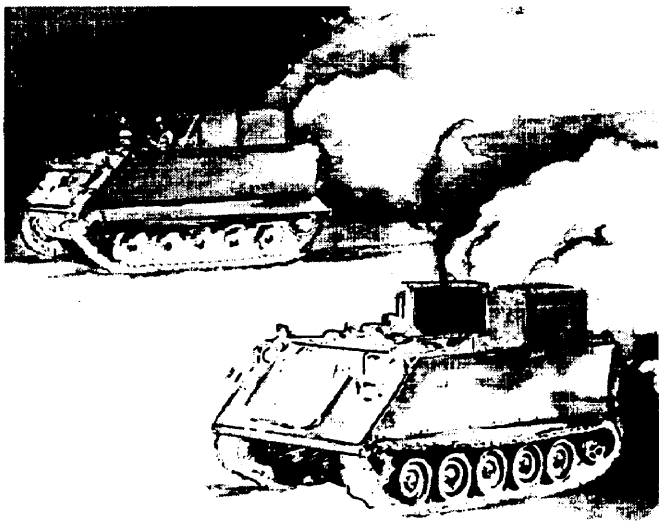
SMOKE CONTROL

Smoke control is essential to the success of any smoke mission. Smoke is affected by any number of physical and tactical conditions on the battlefield. It is nearly impossible for the smoke unit leader to observe how effective his smoke is from the smoke line. An observation point that can clearly see the target area is necessary for the control of the smoke operation. The smoke control point must maintain communications with both the smoke unit and the supported unit. It is imperative that the supported unit commander or S-3 maintain contact with smoke platoon to advise them if there is too much or too little smoke on the target.

Controlling mobile smoke operations requires the platoon leader to maintain communications with the supported unit. The supported unit must inform the smoke platoon leader if the smoke screen is ineffective. The platoon leader may not have visual observation of the supported force and the smoke screen. It may not be possible for the platoon leader to occupy a vantage point.

The platoon leader or smoke control point can use cardinal directions to shift the position of the platoon to maintain smoke coverage. In these circumstances, smoke unit leaders face a rapidly changing situation and must respond accordingly. Cardinal directions may be used with compass point orientation: for example, "All elements, north, 300 meters," or by clock orientation, "All elements, three o'clock, 300 meters."

CHAPTER FOUR
M O V E M E N T



The tempo of operations demands that smoke units supporting maneuver forces spend a lot of time moving. All smoke platoons will spend more time moving than generating smoke. Moving carelessly may cause a unit to make contact with the enemy and suffer needless casualties.

FUNDAMENTALS

To survive on the battlefield and provide smoke support to maneuver forces, leaders must exercise command and control, maximize the use of terrain, and apply the following fundamentals of movement:

- Move on covered and concealed routes.
- Do not move directly forward from covered and conceded positions.
- Avoid likely ambush sites and other damager areas.
- Enforce camouflage, noise, and light discipline.
- Maintain all-round security including air guards.

The smoke platoons and squads must follow these guidelines:

- Use terrain for protection. Terrain offers natural cover and concealment from enemy observation and cover against fire. Using terrain to protect vehicles is difficult; so, terrain driving must become a habit. Use it when in contact with the enemy and when contact is possible or expected. Vehicle commanders and drivers should use any available depressions and trees to avoid enemy ATGM fire.
- Avoid possible kill zones. Platoons and squads must avoid wide open spaces, especially where high ground dominates, or where cover and concealment is available to the enemy. When moving to a new position, the driver should make use of speed whenever possible. When a danger area must be crossed, use the appropriate overwatch technique, dispersion, and speed.

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CONCEPTS

Leaders place themselves where they can best command and control. Their location is governed by the situation, movement formation, movement technique, and if the unit is making smoke. The selection of the movement formation is based on the factors of METT-T and element control technique. The distance between vehicles varies according to the terrain and enemy. Each vehicle crew is responsible for a different sector to provide all-round security while on the move. Leaders direct movement by using arm-and-hand signals. Radios should be used only as a backup means of communicating, and only on low power when possible.

MOVEMENT ORDERS

Despite the movement technique to be used, the platoon leader issues the platoon an order that explains the what and how for each element. This becomes more critical as the chance for enemy contact increases or the unit must make smoke on the move.

Leaders must be able to give almost all orders for movement techniques by pointing, using arm-and-hand signals, and following SOP. With practice, the platoon and squads will learn the different techniques and formations under various terrain conditions.

The platoon leader, when possible, should issue clear and complete orders to the various elements within the platoon (bounding and overwatch) from the intended overwatch position. This is also true for mobile smoke operations. When this is not possible (such as in fast-moving situations), the platoon leader will direct a specific element to bound or move for a specified distance or time. Example: 1st Squad bound forward 500 meters, 2d Squad provide overwatch; or 1st Squad move north for 5 minutes making smoke, 2d Squad move north-east for 5 minutes making smoke.

MOVEMENT TECHNIQUES

Movement techniques are methods of traversing terrain used by units. They are traveling, traveling overwatch, and bounding overwatch. The likelihood of enemy contact determines which technique is used.

Movement Technique	Likelihood of Contact
Traveling	Not likely
Traveling Overwatch	Possible
Bounding Overwatch	Expected

NOTE

Do not confuse movement techniques and formations with mobile smoke techniques. Mobile smoke techniques are addressed in a later section.

TRAVELING

Traveling movement technique is employed when enemy contact is not likely and speed is necessary. The unit moves in column with a 50 to 100 meter interval. Vehicles move continuously at a maximum safe sped When the column stops, all vehicles herringbone. The unit moves along covered and concealed routes using terrain

masking. The unit automatically contracts and expands, based on terrain and visibility. The unit maintains local security according to its SOP. Each vehicle posts an airguard. The unit leader is located where he can best control.

TRAVELING OVERWATCH

Traveling overwatch movement technique is employed when enemy contact is possible. Unit moves in column with a 50 to 100 meter interval between vehicles and with designated lead and trail elements. Lead element moves continuously, following covered and concealed routes using terrain masking. The lead element is approximately 100 to 400 meters ahead of the trail element, depending on terrain and vegetation. The trail element moves at varying speeds, stopping as required to overwatch the lead vehicle. Visual contact is maintained with the lead element at all times. The trail element overmatches at such a distance that should the enemy engage the lead element, it will not prevent the trail element from firing or moving to support the lead element. In wooded areas or restricted terrain, the unit will reduce speed and interval. In adverse weather conditions, the crew of the lead vehicle dismounts to verify the trafficability of the route. The vehicle following provide overwatch. The unit maintains local security according to its SOP.

BOUNDING OVERWATCH

Bounding overwatch movement technique is employed when enemy contact is expected. Lead element bounds forward following a covered and conceded route using terrain masking. The bounding element may be a single team for a squad movement or the entire squad for a platoon movement. Overwatching teams cover the progress of the bounding vehicles from covered and concealed positions offering observation and fields of fire against suspected enemy positions. Visual contact is maintained at all times. The length of the bound is based on terrain analysis and the ranges and fields of fire from the overmatching vehicles. When cresting a hill, entering an open area, exiting a defile, or moving through any other restrictive terrain, the smoke generator operator dismounts from the vehicle. He moves forward on foot to a point where he can observe all suspected or likely enemy firing positions. The unit maintains local security according to its SOP.

FORMATIONS

There are five formations for mounted movement at the platoon level: column, line, echelon, vee, and wedge.

COLUMN

Use the column formation for road marches, for movement during limited visibility, and when passing through defiles or other restrictive terrain. The platoon can deploy rapidly from the column formation into other formations. The column simplifies control and provides good security.

The staggered column is used for rapid movement across open terrain (figure 4-l). It affords all-around observation and fields of fire. The platoon leader positions himself where he can best control the platoon. The staggered column formation is used by a squad or platoon-size units. Vehicles should maintain a 25 to 100 meter interval and lateral dispersion. The vehicle commander of each vehicle maintains observation of his designated sector. The exact distance between the vehicles is METT-T dependent. Weather conditions and visibility are also important considerations.

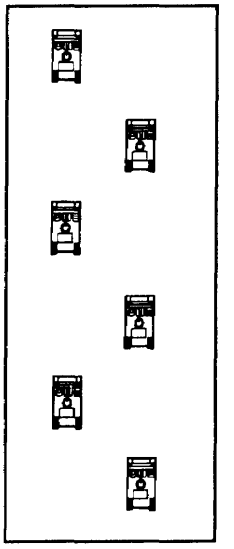


Figure 4-1. Staggered column.

LINE

The line formation is used primarily for rapid movement when time is limited and enemy contact is not expected. This formation provides little flank security.

ECHELON RIGHT (LEFT)

An echelon formation provides good security coverage to the front or flank (figures 4-2 and 4-3). It provides flexibility and speed. This formation does not provide sufficient security if enemy contact is possible or expected.

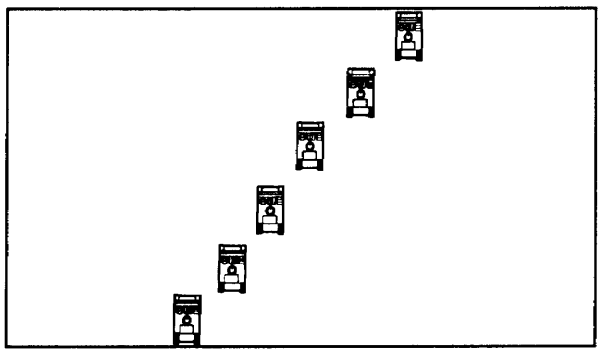


Figure 4-2. Echelon left formation.

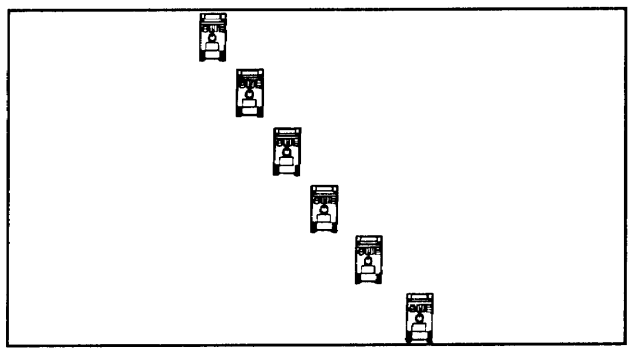


Figure 4-3. Echelon right formation.

VEE

The vee formation affords good security, speed, command, and control (figure 4-4). The split vee can be used when the two squads are operating on different routes. These formations are used when contact is possible but speed is desirable. The lead vee element moves along covered and conceded routes for protection. The trail element moves at variable speed, continually overwatching and providing security. The trail element will always maintain visual contact with the lead element and may stop periodically to provide for better observation.

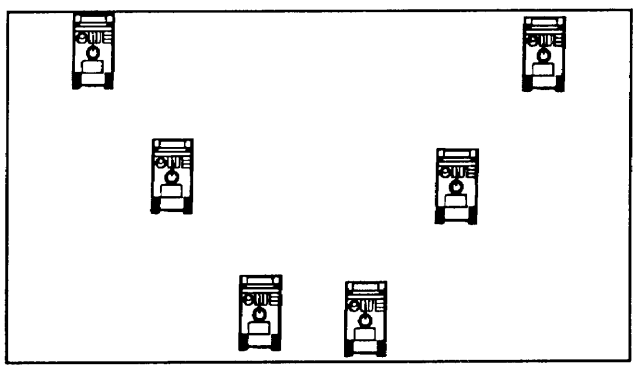


Figure 4-4. Vee formation.

WEDGE

The wedge formation is used by squad or platoon size elements (figure 4-5). It allows for security and facilitates positive command and control. Vehicle dispersion and intervals are again dependent on METT-T and weather visibility. When "spreading out" in open flat terrain, at a minimum each vehicle must maintain visibility of the vehicle to its front. When moving in platoon wedge, the platoon leader positions himself where he can best control movement of the entire platoon. The track commander of each vehicle maintains observation of a designated sector. This formation is used when enemy contact is possible.

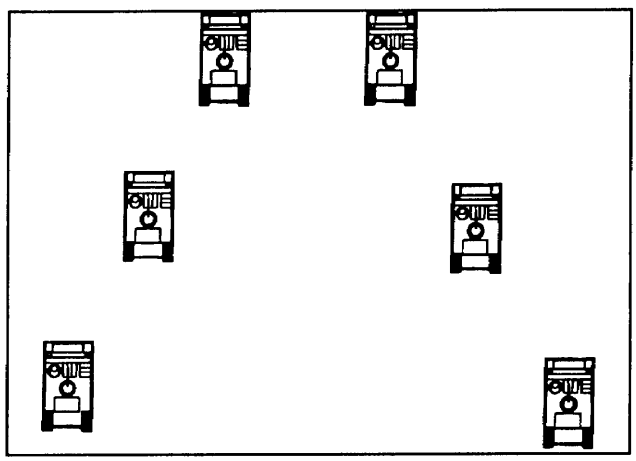


Figure 4-5. Wedge formation.

The column of wedges is one of the most frequently used platoon movement formations (figure 4-6). It allows for optimum flexibility and security and good command and control. It is best employed when traveling or traveling overwatch techniques are warranted. Vehicle dispersion and intervals between squads are METT-T dependent, but the lead vehicle of the trail squad generally needs visual contact with the lead squad. This formation allows squads to deploy into other formations most rapidly should the tactical situation warrant.

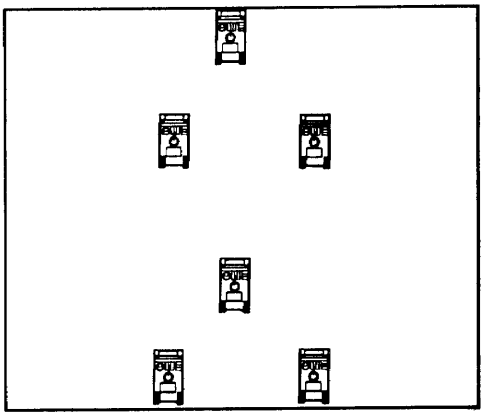


Figure 4-6. Column of wedges.

STATIONARY FORMATIONS

There are two security formations that are used when the vehicles are not moving: herringbone and coil.

Herringbone

Use the herringbone (figure 4-7) to disperse the platoon during a halt when traveling in the column formation. This formation is also used during air attacks. It lets the platoon move to covered and concealed positions off a road or from an open area and establish all-round security without detailed instructions being issued. The vehicles are repositioned as necessary to take advantage of the best cover, concealment, and fields of fire. Crew members dismount and establish security per SOP.

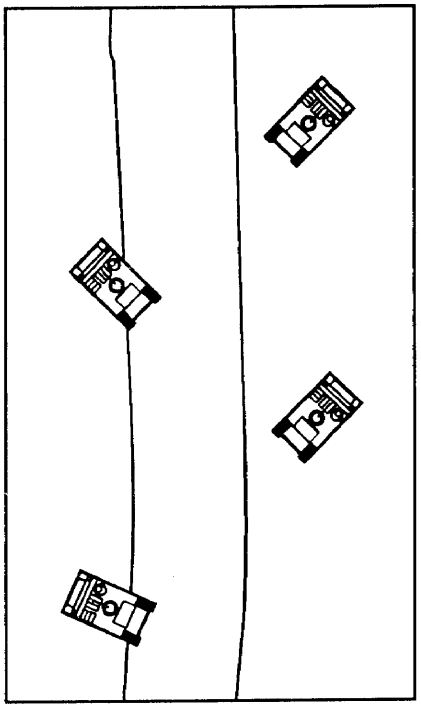


Figure 4-7. Herringbone formation.

Coil

Use the coil formation (figure 4-8) to provide all-round security and observation when the unit is occupying an assembly area. It is also useful for tactical refueling, resupply, and issuing platoon orders. Because this formation presents an easy target, do not use it for long periods during daylight. Post security to include air guards and dismounted personnel. There are two methods used to form a coil.

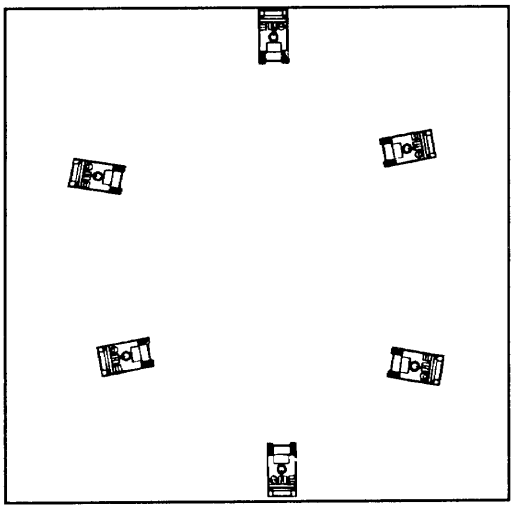


Figure 4-8. Coil formation.

- The first method, when visibility is limited, requires the platoon leader to form the coil by leading his platoon in-a circle. When the circle is complete, all vehicles stop, adjust for cover and concealment, turn 90 degrees outward, and post security.

- In the second method, by the platoon leader signals, quickly moves his vehicle into position, and stops. The other vehicles move directly to their assigned positions, as stated in the platoon SOP, seek cover and concealment, and post security. This technique is used during daylight or whenever speed is essential.

MOVING WHILE MAKING SMOKE

To successfully make smoke while moving, positive control must be maintained. Controlling a mobile smoke mission requires a high degree of planning and orchestration. The smoke the vehicles produce can hamper the ability of the smoke platoon leader to effectively control his own unit. This loss of control places the platoon and mission accomplishment at risk. This requires the use of workable control measures to limit the risk and promote mission success. Mobile smoke operations should only be conducted when there is no other means of accomplishing the mission.

The smoke platoon must rehearse smoke on the move techniques while not making smoke. Develop standard procedures that are not dependent on seeing other vehicles. Establishing a single speed for these procedures is critical. If the platoon does not train to work without visual contact, the likelihood of accidents and mission failure increases.

USE MOVEMENT FORMATIONS

The smoke target or objective maybe stationary or moving. If the platoon is to screen a moving target, then the platoon will assume a formation depending on the wind direction (table 4-1), The vehicles will produce smoke and move with the target. However, smoke system can never move faster than the wind speed or a gap in the smoke cloud will occur. Wind speed has impact on risk analysis in terms of security and vulnerability. The platoon leader must, if possible, move to a vantage point to assume smoke control. The platoon leader must have commo with the moving force to insure that it is adequately screened Each vehicle will maintain visual observation on the vehicle to their front. The lead vehicle is responsible for matching the speed of the target. The lead vehicle also will warn the vehicles following of danger areas or enemy contact. Coordination is required during planning process for additional security assets.

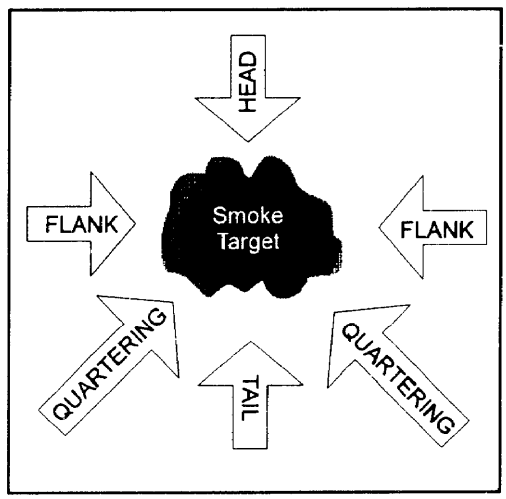


Figure 4-9. Wind directions.

Table 4-1. Preferred formations for making smoke on the move.

Wind Direction	Formations While Making Smoke
Tail	Line
Left Tail Quartering	Echelon Right
Left Flank	Column/Echelon Right
Left Head Quartering	Not favorable
Head	Not favorable
Right Head Quartering	Not favorable
Right Flank	Column/Echelon Left
Right Tail Quartering	Echelon Left

BACK-AND-FORTH TECHNIQUE

The back-and-forth technique is used when the target is stationary and the number of smoke platforms in the platoon are insufficient to occupy a static smoke line. In the back-and-forth technique the vehicles line up perpendicular to the wind direction and drive straight for a distance based on target size and distance to target (figure 4-10). The vehicles continually repeat this process, staying within their assigned lanes. It also can be performed by driving in an orbital or figure eight pattern. Using the back-and-forth technique allows the smoke platoon to cover a larger target by spreading the smoke around. However, the source of the smoke is plainly visible, since this technique provides little or no concealment for the smoke vehicles. During the leader's recon, the platoon leader will identify fighting positions, withdrawal routes, and resupply routes.

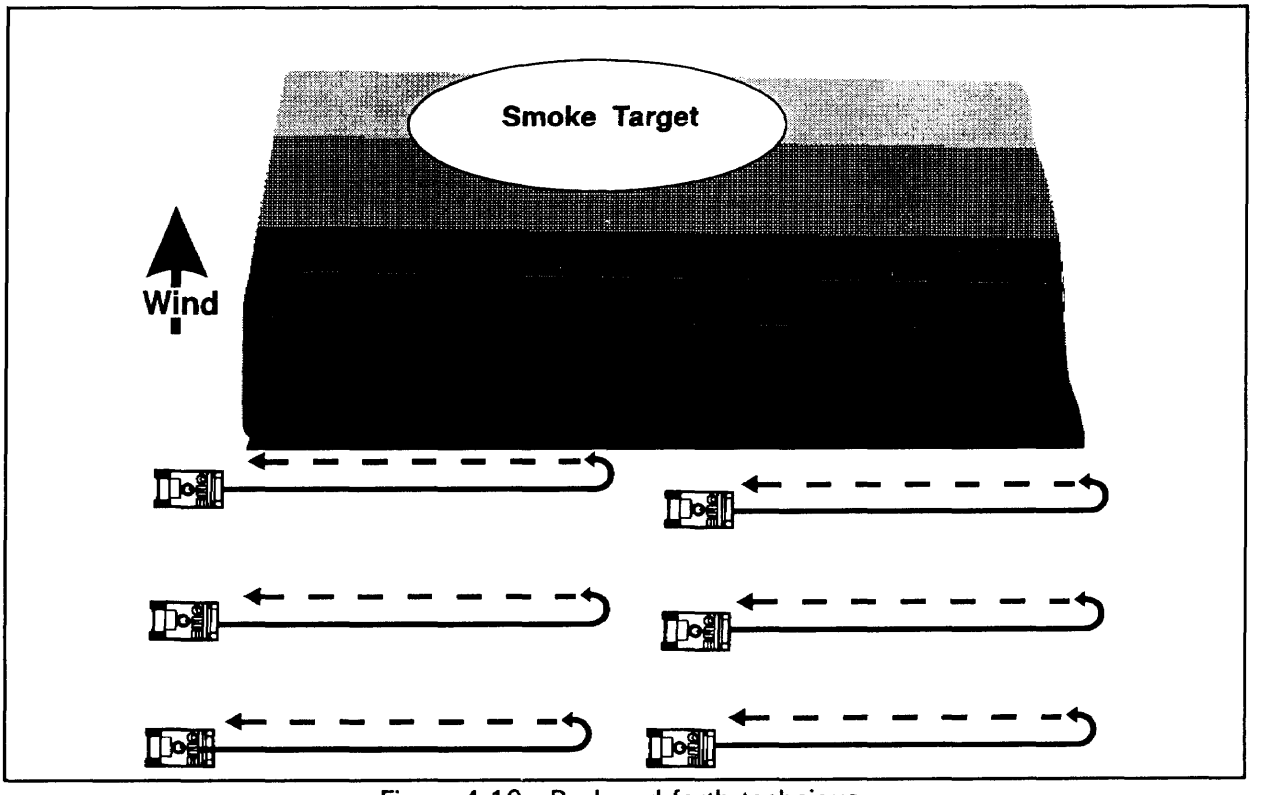


Figure 4-10. Back-and-forth technique.

BOUNDING TECHNIQUES

The rapid pace of hasty smoke missions, particularly when smoke platoons support maneuver forces, often dictate the movement of the smoke platoon from established smoke lines. When forced to displace to maintain smoke coverage, the platoon should use the bounding technique. The bounding technique involves two or more elements successively moving forward of each other. The elements may be squads or individual vehicles. Squad movement is controlled by the smoke control point. Individual vehicle movement is controlled by the squad leader. The stationary element is responsible for providing security for the moving element if possible. Constant communication is critical throughout. The stationary element continues to make smoke while the other element moves. The moving element may or may not produce smoke while moving. This technique allows the smoke unit to support a maneuvering force while retaining a high state of security.

Squad Bounding

The squad bounding technique (figure 4-11) could be used to isolate enemy forces or objectives. The screen is made using two squads, one stationary squad and one bounding squad. The stationary squad makes smoke while the bounding squad and moves to its next position. Upon arrival, both squads make smoke until further bounding is required. The dispersion between squads is 500 to 1,000 meters. This allows for slow movement of the screen. Once the bounding squad is in position, they continue or begin making smoke to conceal the movement of the other squad. The disposition of enemy forces will determine whether the bounding element makes smoke on the move.

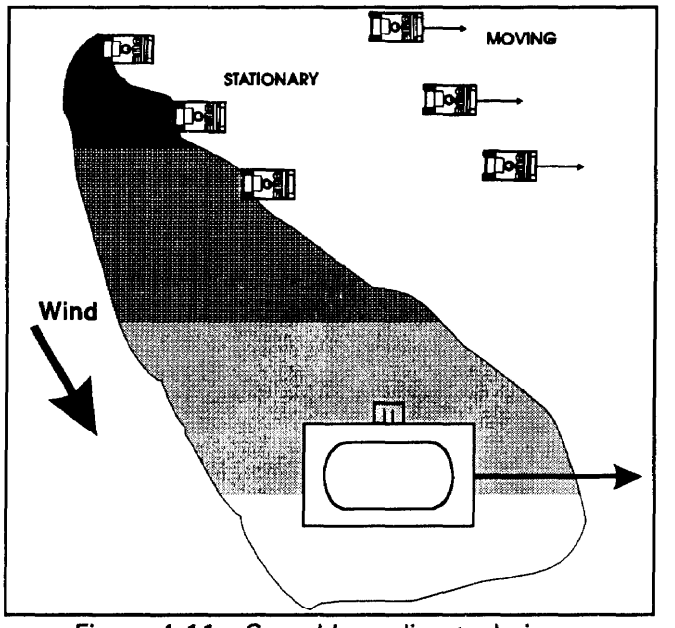


Figure 4-11. Squad bounding technique.

Leap Frog Variation

The leap fog variation (figure 4-12) is similar to the bounding technique. It is used with a cross or quarter wind. The platoon executes the leap frog while stationary. The platoon is in a line or echelon formation. The last vehicle in line moves up to the front of the line, continuing to make smoke as it moves. Once in position it notifies the last vehicle in line, which repeats the leap frog movement on order. The platoon continues to move forward by successive leap frogs. This variation can be reversed by having the vehicles leap frog from the front to the rear of the formation.

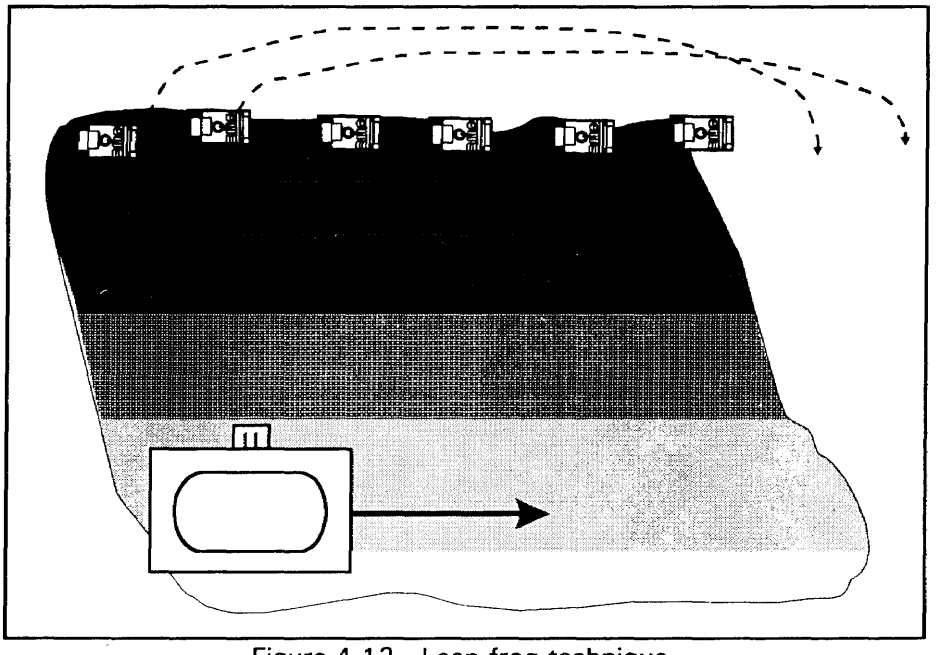


Figure 4-12. Leap frog technique.

RACE TRACK TECHNIQUE

Similar to the back and forth technique, the race track technique (Figure 4-13) can be executed using one vehicle or multiple vehicles. This technique requires extra coordination to avoid collision. However, it is beneficial in reducing friendly vulnerability. By executing the maneuver on the outside perimeter of the smoke line, stationary vehicles are concealed and the smoke from the moving vehicle(s) helps supplement the rest of the mission. Discipline, constant speed, and no stopping are critical.

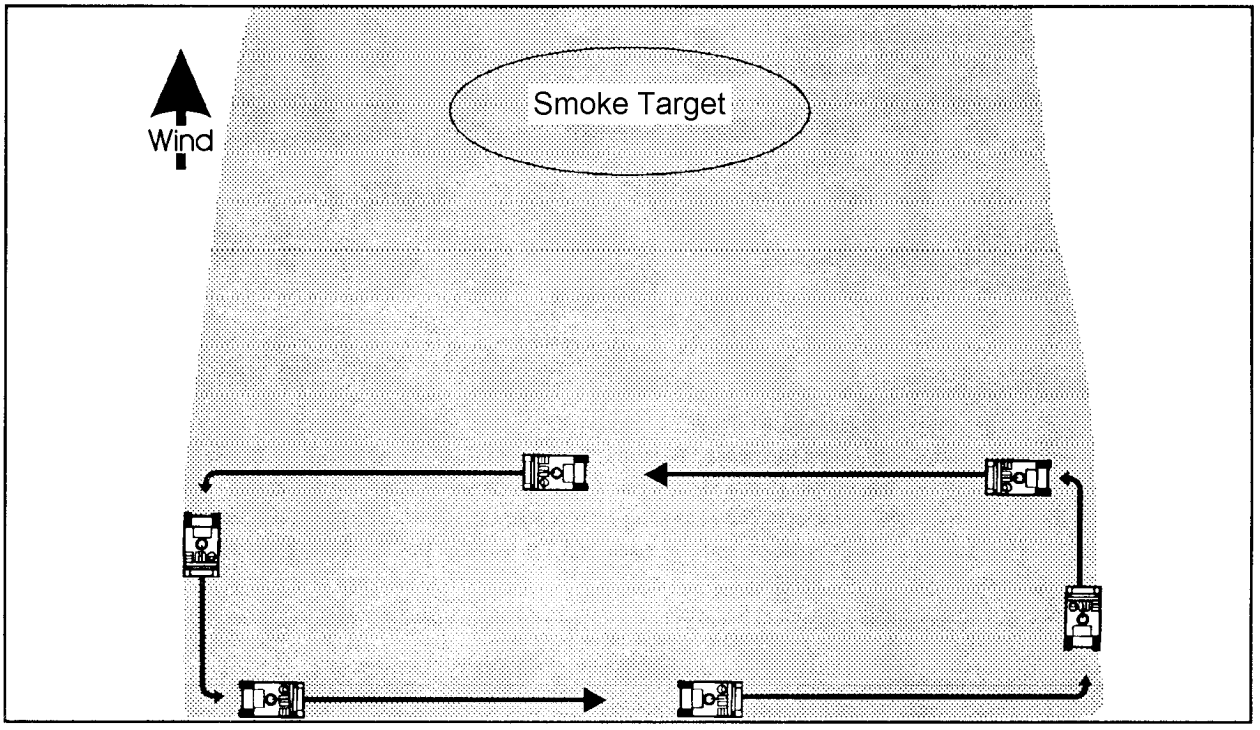
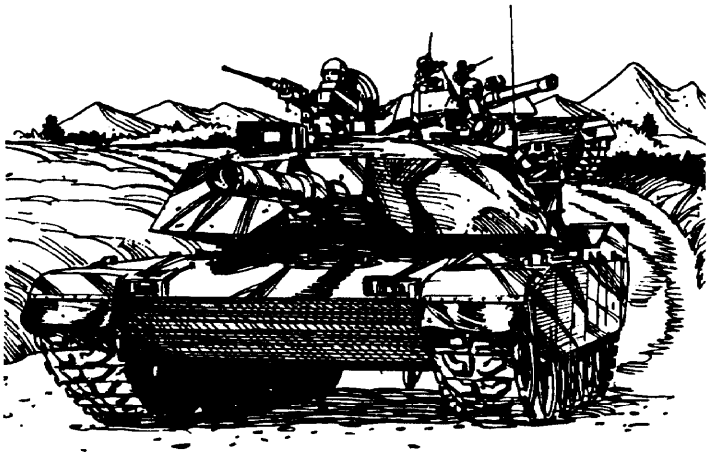


Figure 4-13. Race track technique.



CHAPTER FIVE
OFFENSE

The offense is the decisive form of war. The primary purpose of offensive operations is to destroy the enemy and his will to fight. Generally, smoke favors the attacker. In the offense, maneuver commanders can achieve surprise and protect their force by combining obscurants with maneuver and firepower. Smoke allows us to reduce our vulnerability through concealment as we mass forces to attack. Obscurants will conceal friendly forces and movements and screen breaching of obstacles and river crossings. They will also negate the standoff capabilities of enemy long-range anti-armor weapons and interfere with enemy guidance and acquisition systems. Smoke supports tactical objectives by deceiving the enemy as to the exact location, timing, and axis of the main attack. It also isolates units for piecemeal destruction.

CONSIDERATIONS

The main focus of smoke in the offense is to defeat enemy reconnaissance, surveillance, and target acquisition (RSTA) efforts, conceal maneuver and support forces, and contribute to tactical deception operations. The intent of smoke operations is to deny the enemy information about the disposition and composition of our forces, which enhances surprise and security. Smoke also allows the commander the flexibility to mass the forces required to conduct attacks.

Smoke is used during the offense to--

- Defeat enemy surveillance efforts.
- Conceal moving forces.
- Isolate enemy defensive positions.
- Conceal maneuvering forces from enemy observation.
- Provide tactical surprise and allow the commander to set the terms of combat.
- Allow the commander to mass forces unobserved.
- Support the deception plan.
- Conceal obstacle breaching.
- Defeat enemy weapons by defeating enemy target acquisition efforts, defeating enemy guidance systems, and negating standoff capability of enemy long-range direct fire weapons.

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PHASES OF SUPPORT

All smoke operations during offensive operations tend to occur in sequential phases. The length and nature of each phase, and whether it even occurs, varies from situation to situation. The four phases of support are planning, preparation, execution, and recovery.

PLANNING

The platoon leader must understand the supported unit's mission, concept of operations, and the commander's intent for using smoke. The platoon leader then begins his troop leading procedures. To support a maneuver unit conducting offensive operations, the platoon leader must consider--

- The coremand and support relationship.
- Impact of smoke on friendly forces.
- Location of enemy forces (known and template).
- Range of enemy weapons systems.
- Location of both enemy and friendly obstacles (known and template).
- Steering wind direction and speed.

The platoon will only be effective if the surface wind direction is either tail or tail quartering. Under some situations it also may be possible to provide smoke support if the winds are flanking. Only under special conditions could the platoon provide support if the winds are head winds.

It is important that the platoon leader conduct a leader's recon of the mission area. When possible, the platoon leader, platoon sergeant, and squad leaders should conduct a physical reconnaissance of the area. However, if the situation does not permit a physical reconnaissance, the platoon leader should conduct a detailed map reconnaissance.

The platoon leader, if possible, should issue his order at a terrain vantage point overlooking the operational area. If this is not possible, the platoon leader uses a sandtable when issuing his order. A smoke plan overlay accompanied with the supported unit's operations overlay must also be provided to the squad leaders and higher headquarters prior to mission execution.

During the planning phase, the platoon leader must also consider the platoons resupply. The platoon leader must plan and coordinate the class III resupply of the forward fuel supply point. Other mission considerations include resupply of class I, V, and IX. The element providing any support must understand what is required for mission accomplishment. This requires detailed coordination with the supporting logistics units.

PREPARATION

Once the platoon sergeant and squad leaders have received the warning order from the platoon leader, they can begin preparing the platoon for the next mission. The squads and platoon physically prepare for the offense by conducting precombat checks; maintaining and inspecting equipment; distributing supplies; feeding, resting, and checking the physical health of soldiers; and camouflaging. The platoon leader issues his order to the platoon leadership. He also coordinates with the supported unit to ensure that they understand how he will execute the mission. A smoke plan overlay is provided to the supported unit. The platoon leader may be required to briefback the supported unit and attend rehearsals. Depending on the type of rehearsal, just the platoon leader or the entire platoon may be involved in the supported unit's rehearsal. The platoon under control of the platoon leader and the squad leaders should rehearse its actions. A sand table type rehearsal may be the best for the platoon. The entire platoon should attend. In any spare time, the platoon should continue to train and rehearse. Training and rehearsals must always be mission specific.

EXECUTION

The smoke platoon's mission may begin prior to the start of the supported unit's operation. The platoon begins movement with sufficient time to get to the operational site or to cross the LD in designated order of march. The platoon will test the steering wind direction prior to starting any smoke operations. A smoke grenade thrown to test the surface winds will identify any deviation from the predicted wind direction and speed. This will allow the platoon to reposition their smoke line or place in the supported unit's formation. The platoon leader will monitor both the platoon net and the supported unit's net (usually the command net). Radio traffic on the platoon net should be kept to a minimum. The platoon, if operating in an unsecure mode, must not discuss the operational aspects of the mission without using codewords.

A technique is for the platoon to occupy a position one or two terrain features from the operational area. The leaders go forward to conduct final climatic checks. Based on the findings of the final climatic check, the platoon leader adjusts the plan. Upon returning to the hasty assembly area, the platoon leader briefs the key personnel on the adjusted plan. The platoon then moves out to the operational area.

Once smoke operations begin, the platoon leader should attempt to position himself at a vantage point to observe both the smoke cloud and the intended target area. The platoon leader can the reposition the platoon as required to ensure adequate coverage of the target area.

If the platoon is stationary, each smoke vehicle driver will attempt to find a covered and concealed position for his vehicle. The platoon should be concerned about local security.

While moving, the platoon must react quickly if it encounters an enemy force unexpectedly. The platoon will execute its battle drills and attempt to continue the mission.

The platoon sergeant will monitor the consumption of class III and V during the mission. If necessary, the platoon will conduct resupply during the mission. After the completion of each smoke mission, the platoon leader will inform the supported unit of the platoon's status. The format of this report is specified in the platoon SOP to minimize radio traffic.

RECOVERY

During the recovery phase, the platoon will rearm, refuel, and refit as quickly as possible. The platoon's main objective during this phase is to become fully mission capable and ready for future operations. If the platoon has suffered losses, both in equipment and personnel, during the execution phase, it will require more time to become mission capable. The platoon may need to conduct training if it has had a significant number of replacements. The platoon leader may be involved in the planning of the next operation while the platoon is recovering. The platoon sergeant will supervise the platoon's recovery efforts. The platoon could conduct recovery operations under the control of the supported unit or under company control. If the platoon requires significant time to recover, it must be placed back under control of its company headquarters. Movement back to the parent headquarters may require additional coordination with the supported unit for recovery assets, use of main supply routes (MSRs), and so forth.

SMOKE OPERATIONS

MOVEMENT TO CONTACT

The purpose of a movement to contact in an offensive operation is to make initial contact with the enemy or to regain lost contact. Because a movement to contact is characterized by a lack of information about the enemy, movement techniques are chosen for maximum security and flexibility. A movement to contact usually ends in a meeting engagement with a moving or stationary enemy, followed by a hasty attack or hasty defense.

The supported force conducts a movement to contact in a way that risks the smallest part of the force while the remainder is available to immediately respond when contact is made. The movement to contact is characterized by decentralized control and rapid movement and commitment of forces from the march. Each side attempts to seize the initiative or overwhelm the opposing force and impel it into the defense.

The force conducting a movement to contact is normally organized into a forward security element, security force, flank and rear guards, and a main body. The forward security element develops the enemy situation and prevents the unnecessary delay of the main body. The security force fights through small concentrations of enemy forces. It ensures that the main body can deploy uninterrupted into the attack formations. The flank and rear guards protect the main body from ground observation and surprise attack. Flank guards travel on routes parallel to the main body. The flank guards travel continuously or by alternate bounds to occupy key terrain on the flanks of the main body. The main body is organized to execute hasty attack or defense.

Most smoke operations during a movement to contact will be hasty smoke, initiated because of enemy contact. Most commanders will not use smoke prior to contact so that target acquisition is not obscured. Once contact is made with the enemy, the commander will most likely choose to use hasty smoke. By using smoke prior to enemy contact, the commander may signal his intentions or by-pass enemy forces unknowingly. The use of projected smoke should be coordinated with the employment of the smoke platoon.

Typically, smoke platoon in support of maneuver forces will move with the main body. The advanced guard will encounter the enemy and use projected hasty smoke. The main body will continue to move forward to outmaneuver the enemy force. The smoke platoon will provide screening smoke to conceal the main body as it maneuvers and assaults the enemy.

The best formation for the smoke platoon to travel in is a wedge or vee formation. This allows for security and a rapid transition to smoke operations. The platoon leader will order the platoon into the appropriated formation for smoke operations based on the main body commander's order and the wind direction.

If possible, the smoke platoon should attempt to establish a stationary smoke line. The smoke line provides more security than mobile operations because of the unclear enemy situation. In a movement to contact, the exact location of all enemy forces is not known and it is possible for the platoon to encounter an enemy force moving or making smoke.

Upon contact with the enemy, the platoon leader must quickly determine the threat and respond appropriately. If the platoon is capable of destroying the enemy force (dismounted troops or lightly armored vehicles), the platoon should engage. If the enemy is of sufficient size, the platoon must execute a break contact drill. The platoon leader must keep the supported force informed of the situation.

HASTY ATTACK

The hasty attack differs from the deliberate attack by the amount of time allowed for planning and preparation. The hasty attack results from a meeting engagement or when bypass has not been authorized. It is conducted when enemy forces are in a vulnerable position. The enemy is vulnerable when he is unprepared or unaware of hostile forces. Hasty attacks are conducted to catch the enemy off-guard. The commander must move quickly to gain the advantage. Speed and violence can overcome lack of preparation. Hasty attacks are initiated and controlled with FRAGO's. The use of SOPs and battle drills are critical to effective execution of hasty attacks. There are two categories of hasty attacks depending on the disposition of the enemy: an attack against a moving force and an attack against a stationary force.

A hasty attack against a moving force occurs when two opposing forces coverage. The side that wins normally acts the fastest and maneuvers to positions of advantage against the opponent's flank. Tanks normally lead the attack against a moving enemy force.

A hasty attack against a stationary force is initiated after scouts or lead maneuver forces reconnoiter the enemy's positions. They try to find flanks or gaps in the enemy's positions to exploit.

The supported units contingency planning and SOP reactions to contact simplify the execution of a hasty attack. At the brigade level, the brigade commander maneuvers trailing or adjacent units against the enemy's flanks or rear. He attacks by fire and interdicts enemy units attempting to do the same.

The scouts and security force provide initial information on the enemy force and develop the situation. The lead unit defends from hasty positions to fix the enemy element. The trail units attack enemy flanks supported by indirect fires and close air support.

Since time is a limited resource, priorities of support must be established and an abbreviated coordination process must occur. A hasty attack following a meeting engagement relies on SOPs and battle drills. Smoke units will be employed with the supported force to provide large-area smoke screens to hinder enemy observation and conceal friendly maneuver.

The smoke can be employed to screen the movement of the battalion, obscure the enemy's observation, or deceive the enemy. The use of projected smoke should be coordinated with the employment of the smoke platoon.

DELIBERATE ATTACK

The deliberate attack differs from the hasty attack by precise planning based on detailed information, through IPB, and rehearsals. Deliberate attacks normally include large volumes of supporting fires, identified main and supporting attacks and deception measures. Since time is taken to plan and prepare for a deliberate attack, the enemy has had more time to prepare his defense.

Thorough reconnaissance throughout the zone is conducted to obtain detailed information on the enemy's disposition. Sufficient time is provided to prepare for the attack. Deliberate attacks are generally conducted against well-organized defenses. There are several applications of smoke to support deliberate attacks. Possible applications include screening the line of departure, screening vulnerable flanks, screening open areas, screening an obstacle breach, or confusing the enemy (supporting deception operations). Screening obstacle breaches are difficult because obstacles are normally covered by fire. When planning, smoke units must consider the range of enemy direct fire weapons. The use of generated smoke in support of a breaching operation depends on favorable steering winds. Winds blowing from the enemy side of the obstacle will normally negate the use of generated smoke. When the wind direction is unfavorable, the use of projected smoke must be considered.

Typically, fire support assets do not have sufficient quantities of smoke munitions to provide sustained smoke during the attack. Smoke units will provide sustained large area smoke operations. Projected smoke munitions should be used to create enough smoke to allow the smoke unit to get into a position to sustain the screen. Projected smoke is also used directly on enemy positions.

Other considerations when supporting a deliberate attack are the tempo of the attack and duration of the operation.

- Tempo. The M1059 Mechanized Smoke System cannot keep pace with M1A1 Abrams Tanks and M2 Bradley Infantry Fighting Vehicles (BIFV). The maximum speed of the M1059 is approximately 45 mph. However, after fully combat loading the M1059, its speed is considerably reduced (about 25 mph).

- Mission Duration. The length of the mission can be a constraining factor, The M1059 can generate smoke for a maximum of two hours maximum by operating only one generator. Smoke platoons executing long duration missions or multiple missions must refuel throughout the extended duration mission.

During offensive operations against a well established, defending enemy, smoke mission of long duration can be used to preserve the attacking force. Large smoke hazes, started well before the LD time can conceal the intended route or axis of advance. Additionally, friendly forces can use smoke to conceal their movement against an enemy force that has clear or unhindered view of the friendly maneuver (open grass lands or deserts). The friendly force can maneuver within the smoke hazes, changing his scheme of movement to attack the enemy in an unexpected point.

Supporting a Deliberate Attack

During a recent rotation at the National Training Center, a mechanized smoke platoon provided long duration smoke support to a mechanized infantry task force conducting a deliberate attack. The smoke mission began three hours prior to the TF's LD. By 0530 hours, a smoke haze had formed from Colorado Wadi to Hill 876, a distance of about 10 km. The TF crossed the LD and moved along the southern attack axis. Shortly After crossing the LD, an OPFOR forward reconnaissance element detected movement of the TF. The OPFOR commander repositioned his reserve to his southern battle position. Under cover of the smoke haze, the TF executed a turn to the north and attacked along it's northern axis. This sudden change from the southern axis to the northern axis caught the OPFOR by surprise.

EXPLOITATION

An exploitation is an offensive operation that usually follows a successful attack to take advantage of weakened or collapsed enemy defenses. Its purpose is to prevent reconstitution of enemy defenses, to prevent enemy withdrawal, and to secure deep objectives. It may follow either a hasty or deliberate attack. An exploitation can include --

- Securing objectives deep in the enemy rear.
- Severing lines of communications.
- Destroying enemy units.
- Denying escape routes to an encircled force.

In an exploitation, the prime considerations are speed and the placement of maximum firepower forward. Generally, generated smoke support for this type of offensive is infeasible. However, because exploitations are normally follow-on missions, refueling operations and vehicle maintenance are prime concerns of combat service support (CSS) elements. Further, a trafficable and flexible MSR is vital to the success of the exploitation. While the enemy is greatly reduced, the threat to CSS activities from bypassed forces or even counterattacking forces remains. To mitigate their vulnerability, smoke can be used to provide concealment and protection. Potential smoke employment options, therefore, may include screening an MSR, screening a logistical resupply points (LRPs), conceding a traffic control point, or concealing a unit maintenance collection point (UMCP).

Since the exploitation mission will evolve from another offensive action in which the smoke platoon was likely used in another capacity, the platoon must undergo resupply before continuing the mission. Weather and terrain will continue to determine the suitability of smoke employment.

PURSUIT

A pursuit is an offensive operation against a retreating enemy force. It follows a successful attack or exploitation and is ordered when the enemy cannot conduct an organized defense and attempts to disengage. The purpose of the pursuit is to complete the destruction of the enemy while he’s withdrawing. The enemy force itself is the main objective.

The pursuit usually consists of direct pressure and enveloping forces. The direct pressure forces prevent the enemy from disengagement and inflict maximum casualties. These forces must not allow the enemy to break contact. The enveloping force penetrates to the rear of the enemy and prevents his escape. It destroys the enemy with support from the direct pressure force.

CHAPTER SIX
D E F E N S E

Defensive operations retain ground, gain time, deny the enemy access to an area and damage or defeat attacking forces. The defense can deny the enemy victory; it cannot assure victory. The defense is a temporary state that creates the conditions that allow the force to assume offensive operations. Defensive operations are conducted to--

- Defeat an enemy attack.
- Gain time.
- Concentrate forces elsewhere.
- Control key or decisive terrain.
- Wear down enemy forces as a prelude to offensive operations.
- Retain strategic, operational, or tactical objectives.

During defensive operations commanders will synchronize deep, close, and rear operations to execute their defensive plan. The use of smoke, integrated with jamming and deception can disrupt an enemy force. Smoke platoon can execute operations throughout the battlefield.

Smoke units are integrated throughout the defensive battlefield.

Security: Smoke units provide the security force commander flexibility.

MBA: Smoke units provide the commander flexibility and enhance the survivability of defending units.

Reserve/Mobile Striking Force: Smoke units enhance the survivability of these forces and provide the commander with flexibility once the reserve is committed.

Rear: Smoke units assist the commander's ability to retain freedom of maneuver in rear areas. Survivability of forces in the rear area is also enhanced by these units.

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PATTERNS OF DEFENSIVE OPERATIONS

MOBILE DEFENSE

Mobile defense orients on the destruction of the enemy forces by trading terrain to expose the enemy to a counterattacking mobile striking force. The minimum force possible is committed to pure defense; maximum combat power is placed in a striking force (with mobility greater than the enemy's) that catches the enemy as he is trying to overcome that part of the force dedicated to the defense.

AREA DEFENSE

An area defense focuses on denying the enemy access to designated terrain for a specified time, rather than on the outright destruction of the enemy. A commander may conduct an area defense by using mutually supporting positions in depth. Where ground cannot be easily surrendered or when enemy forces are weak and disorganized, the commander may use a forward defense, which is an area defense with little depth. A perimeter defense is a type of forward defense, where a commander maintains the integrity of the perimeter by making his main effort well forward and counterattacking early.

CONSIDERATIONS

The main focus of smoke in the defense is to defeat enemy reconnaissance, intelligence, surveillance, and target acquisition (RISTA), and to conceal maneuver and support forces. Our intent is to deny the enemy information about the disposition and composition of our forces. That allows us to gain time, concentrate forces elsewhere, control key or decisive terrain, and wear down enemy forces as a prelude to offensive operations.

The overall goal is to improve the commander’s ability to retain his initiative in operations against a potentially numerically superior force. Uses of smoke in the defense to support maneuver, provide additional firepower, and to protect the force are essentially the same as in the offense.

Key insights on smoke use in the defense are:

- Smoke compresses the battlefield, with engagements fought at shorter range.
- We must use alternate weapon positions in smoke.
- Smoke requires more detailed planning and command and control (C^2) coordination.
- Use smoke in deception, at night, and for obstacle reduction.
- Units that do not train in smoke do not perform well.

PHASES OF SUPPORT

PLANNING

Planning at the platoon level during defensive operation does not differ from the planning conducted during offensive operations. To support a maneuver unit during a defensive operation, the platoon leader must consider--

- Command and support relationship.
- Friendly scheme of maneuver.
- Supported unit commander's intent.
- Likely enemy course of action.
- Location of friendly obstacles.
- Steering wind direction and speed.

As during offensive operations, it is important that the platoon leader conduct a leader's recon. The platoon leader should conduct a physical reconnaissance of the area and determine the location of friendly obstacles. This will prevent fratricide from friendly minefield and other obstacles.

The smoke platoon leader conducts a terrain analysis in the same manner as the S2, but with a different focus. Since the smoke platoon will not make smoke until the enemy force has been engaged, there is lower risk that the smoke unit will give away the location of the battle position (BP). Tasks during planning and preparation include--

- Terrain Analysis.
- Weather Analysis.
- Reconnaissance.

Smoke control is critical to avoid interference with friendly target acquisition. Obtain guidance from the supported unit on "No Smoke Areas." Ensure the smoke control officer has communication with the platoon and can stop smoke if steering winds carry it into the engagement area. The engagement area is a target-rich environment that the supported commander will generally want left completely unobscured.

The platoon leader will obtain a copy of the fire support overlay prior to departure, or coordinate with the fire support officer (FSO) to use existing terrain index reference system (TIRS) to adjust fire. Again, under most conditions, the smoke platoon will not need to call for or be allowed to adjust fires.

The smoke platoon will generally provide support from stationary positions which afford the maximum camouflage and cover immediately available. Ensure that each vehicle commander knows the primary and alternate routes from their positions back to the assembly area. Ensure squad leaders have conducted a reconnaissance of those routes.

Because of the nature of a defense, the air threat may be very high. Obtain the current air defense warning and weapons control orders prior to issuing the platoon operations order. The air threat may dictate assigning air guards at all times. Rehearse platoon response to the air threat.

The smoke platoon may be directed to conduct smoke operations well prior to the enemy being engaged. Screening the engineer preparation of the battlefield and obscuring locations of reserves or support areas are typical missions. The smoke platoon may participate as part of the supported units deception operations.

PREPARATION

The squads and platoon conduct precombat checks and inspections. All equipment and personnel are readied for the upcoming mission. The platoon leader issues his order to the platoon leadership, providing them a defensive overlay and using a sandtable when possible. Platoon orders must thoroughly cover the defensive operations and possible enemy courses of action to reduce reaction time of the platoon.

If the platoon is to operate forward of the main battle area, the platoon must know the--

- Location of friendly obstacles.
- Location of designated passage points and lanes.
- Recognition signals.
- Location of the counter-reconnaissance screen.

The need for close coordination with the supported unit remains the same during defensive operations. Smoke units operating forward of the supported unit's defensive positions must understand the unit's scheme for counter-reconnaissance. This will reduce the possibility of fratricide. The platoon must coordinate all movements in the main defensive area to prevent losses to friendly minefields, obstacles, and counter-reconnaissance efforts.

The platoon leader should obtain a copy of the fire support overlay prior to departure or coordinate with the FSO to use existing TIRS to adjust fire.

Ensure that each vehicle commander knows the primary and alternate routes from their positions back to the assembly area. Ensure squad leaders have conducted a reconnaissance of those routes.

EXECUTION

The smoke platoon's mission may begin prior to the execution of the defense. The platoon may be executing smoke operations during the supported unit's preparation of the defense. Throughout the conduct of the defensive operation, the platoon must be aware of increased enemy reconnaissance operations. This means that the platoon could encounter enemy reconnaissance elements during smoke operations or while in their assembly area.

The platoon must determine the exact nature of the steering winds prior to starting the generators. A smoke grenade is one method of testing the surface wind conditions. By testing the wind direction, the platoon leader can modify the smoke plan if necessary.

Once smoke operations begin, the platoon leader should attempt to position himself at a vantage point to observe both the smoke cloud and the intended target area. The platoon leader can then reposition the platoon to ensure adequate coverage of the target area. The smoke platoon should not be positioned as the most forward positioned ground element.

RECOVERY

The platoon must recover quickly to support possible follow-on offensive operations. The platoon will rearm, refuel, & refit as quickly as possible. The platoon's main objective during this phase is to become folly mission capable.

SMOKE OPERATIONS

This section describes how a smoke platoon provides smoke support during the various defensive operations.

THE COVERING FORCE FIGHT

Corps and division may establish a covering force as the first echelon of a two-echelon defense. The function of the covering force is to destroy the leading elements of the attacking force causing the deployment of follow-on forces and forcing the enemy to disclose his main effort. The size and composition of the covering force is dependent on METT-T. Normally a covering force is organized around tank-heavy task forces and armored cavalry regiments.

Normally, the covering force will defend, delay, and attack with its maneuver units. When elements of the covering force are unable to retain terrain forward of the forward edge of the battle area (FEBA), they will withdraw through the element conducting the defense of the main battle area. Generally the entire covering force will not withdraw as a whole.

Smoke units will provide smoke to conceal movement of friendly forces, defeat enemy intelligence gathering efforts, and conceal the emplacement of obstacles. Smoke provides the commander with flexibility and agility. Smoke is used to support deception operations.

Typically the covering force will fight from a series of battle positions, trading space for time. The covering force can use smoke to screen disengaging forces. Because of the uncertain nature of the covering force, the supporting smoke platoon will most likely execute a series of hasty smoke missions.

Supporting the Covering Force

The smoke platoon occupies a position near the rear of the covering force area. The platoon's mission is to create a smoke screen to slow attacking enemy forces and allow the engaged covering force element to break contact. Enemy contact in the southern portion is heavy. The brigade comrnander orders the smoke platoon to provide the southern TF smoke support. The platoon leader moves the platoon in a column formation using the traveling overwatch technique. This allows the platoon to reposition quickly. The platoon leader contacts the southern TF on their command net. The TF commander orders the platoon to occupy a position vicinity Chtxkpoint B12 and gives the coordinates where he wants smoke. The platoon occupies a smoke line near the checkpoint and begins to generate smoke using one generator per vehicle. The platoon leader occupies a smoke control point overmatching the target area. The platoon adjusts the smoke line to insure the target area is concealed with a haze. Once the TF elements withdraw through the haze, the platoon with use both generators on each vehicle to create a blanket. The platoon uses the bounding overwatch technique to move to the passage point. Prior coordination with the unit providing command, control, and security at the passage point is essential in order to avoid fratricide as the platoon withdraws. Once at the passage point, the platoon stops smoke and moves through the passage lane. The platoon occupies an assembly area. The platoon leader contacts the brigade for further instructions. While in the assembly area, the platoon refuels.

DEFENSE IN SECTOR

A defensive sector is an area designated by boundaries that define where a unit operates. In a defense in sector, several applications for smoke are possible. Possible uses include screening obstacle emplacements, concealing disengaging forces, concealing counterattacking forces, obscuring and isolating enemy formations, and screening the flanks to prevent enfilade fires. Vulnerability of fuel supply assets is a limiting factor, since it is often impossible to conduct on-line refueling during the defense.

The platoon will be operating forward of TF BPs in a future engagement area. The smoke platoon leader must coordinate egress and ingress routes with the appropriate maneuver commander. This is particularly important for the fuel support squad. The fuel support squad may make multiple trips to sustain the smoke platoon. Unless the defending units are aware of movement of the support squad and smoke platoon, there will be an increased risk of fratricide.

Supporting a Defense in Sector

The smoke platoon occupies a smoke line and begins to generate smoke. The smoke platoon leader occupies a smoke control point that overwatches the target area. The platoon leader maintains communication with the engineers emplacing the obstacles to ensure that the smoke does not hinder their operations. Three hours of fog oil and MOGAS supplies are pre-positioned near the smoke line. The support squad has established an FFSP behind the northern BP. The platoon leader shifts the squads to maintain the screen. As the air stability changes from inversion to unstable, the platoon changes from maintaining a smoke haze to a smoke curtain. As conditions become more unfavorable for making smoke, the platoon uses the obital technique for making mobile smoke. By making mobile smoke, the platoon can maintain the smoke curtain. However, diesel fuel consumption is greater as the vehicles move in their orbits.

After ending evening nautical twilight (EENT), the platoon repositions and creates a smoke haze to conceal the movement of the two tank teams. Once the tank teams are in position, the platoon moves along designated routes through the main battle area. The platoon occupies an assembly area in the brigade rear. The platoon immediately begins to refit.

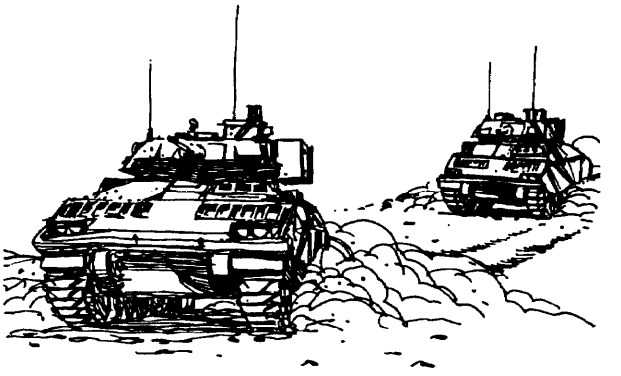
DEFENSE OF A STRONGPOINT

A unit is given a strongpoint defense mission when terrain retention is required to stop or redirect enemy formations. Battalion strongpoints may be positioned adjacent to restrictive terrain or other defensive positions. In a strongpoint defense mission, the applications of smoke include screening obstacle emplacements, concealing maneuver of reserve forces, and protecting the force from enfilade fires.

DEFENSE OF A BATTLE POSITION

A BP is a location and orientation of forces on the ground from which units defend. Maneuver forces use BPs when the brigade controls the maneuver of all forces throughout the sector or at some point within the sector. In a defense by battle position, the same applications of smoke apply as in a defense in sector. Tactics include screening obstacle emplacements, concealing disengaging forces, concealing counterattacking forces, obscuring and isolating enemy formations, and screening the flanks to prevent enfilade fires.

CHAPTER SEVEN
OTHER TACTICAL OPERATIONS



There are several other tactical operations covering a wide range of special-purpose operations undertaken routinely during offensive and defensive operations. While these operations are not the main focus of the commander at the tactical level of war, smoke may support these operations as well. These operations include --

- Military operations in urban terrain (MOUT).
- Passage of lines.
- River crossings.
- Retrograde operations.
- Relief-in-place operations.
- Linkup operations.
- Breakout from encirclement.
- Fixed site support.
- Rear area protection.
- Breaching operations.
- Decontamination site reconnaissance.

Smoke and obscurant use in other tactical operations requires the same careful planning and execution as with the offense and defense. Special considerations include--

- Know the limitations of your delivery systems. Smoke does not behave the same in all conditions or environments (for example, the jungles of Central America versus the woodlands of Europe). Plan for differences in coverage.
- Use smoke to mask terrain from aerial observation. Except for jungles, much of the terrain described in this chapter affords good aerial observation. By masking key terrain features, you reduce your vulnerability as targets of opportunity for high-performance aircraft.

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MILITARY OPERATIONS IN URBAN TERRAIN

Urban combat is characterized by--

- Reduced mobility.
- Fortified positions.
- Restricted observation.
- Reduced range of weapons.

In urban terrain, ranges are drastically reduced. The attacker can take advantage of the cover and concealment offered by built-up areas, but the defender receives the same advantage in his defensive positions. There are three major types of terrain in nearly every built-up area:

- Obstructions, such as buildings and heavily wooded parks.
- Flat, open terrain over water, such as rivers and lakes.
- Flat, open terrain over concrete or asphalt, such as parking lots, multiple-lane roads and highways, and open lots.

Considerations for smoke use in MOUT include--

Air Currents. Air currents are unpredictable. Obstructions tend to break up smoke streamers, which re-form into a more uniform cloud. Convection currents over open areas cause smoke to rise.

Observation. There are many observation points at multiple levels which allow observation from either above or below smoke.

Coverage. Downwind coverage is often less due to obstructions breaking up the smoke, unpredictability of air currents, and smoke following street patterns. The Berlin Brigade showed us that open areas in cities tend to cause smoke to rise and obscure key observation points. This is a particular problem over wide expanses of concrete.

Diffusion. Smoke diffuses well at night but tends to rise to rooftop level about one hour after sunrise until one hour after sunset. Burning rubble degrades the screening efficiency of smoke.

Synchronization. Smoke and obscurant use in MOUT requires careful planning and execution to prevent interference with movement, assault operations, or target acquisition; to retain the element of surprise; and to avoid silhouetting or drawing undue attention to friendly forces.

Rehearsal. Rehearsal of displacement under smoke will help you avoid confusion and disorientation.

Stand-off Distance. Urban terrain causes smoke streamers to breakup quickly, creating the uniform phase closer to the smoke source. You can place smoke sources closer to target areas.

Vulnerability. Smoke units are extremely vulnerable in urban areas due to smoke generator signature. In addition, stationary smoke positions need to be closer to the target than over other terrain, bringing smoke generator elements within range of enemy small arms weapons. Stationary smoke systems requrire additional security support. Employ smoke generator vehicles in groups of three, with two vehicles making smoke and one vehicle overmatching. Ensure the entire squad or platoon makes smoke simultaneously to preclude drawing attention to a lone vehicle or element.

PASSAGE OF LINES

A passage of lines is a coordinated movement of one or more units through another unit. Units conduct passage of lines to continue an attack or counterattack, envelop an enemy force, pursue a fleeing enemy, or withdraw a security or main battle force. Synchronization is the overriding imperative. In passage of lines, the considerations for smoke use are--

- Conceal movement of maneuver and support forces, allowing the commander to mass forces unobserved.
- Conceal maneuver and obstacle breaching.
- Make smoke at the contact point, along passage lanes, and along the flanks to conceal movement.
- Use smoke forward of passage points. You must carefully control the smoke to prevent silhouetting your units.

RIVER CROSSINGS

Units conduct river crossings as part of a higher headquarters scheme of maneuver. The commander's objective is to project his combat power to the exit side of the river quickly to maintain the unit's momentum. The overriding imperative is synchronization. Effective command and control are critical for success. Apply all techniques to minimize the interference caused by smoke.

In river crossing operations the considerations for smoke use are --

- Conceal the movement of the initial assault force.
- Obscure and isolate the exit bank of the river for rapid occupation by maneuver forces.
- Conceal emplacement of crossing means such as engineer bridges.
- Obscure and isolate follow-on objectives to allow the commander to rapidly project combat power across the river.
- Obscure a large length of river to conceal crossing sites, assault and support forces, crossing means, and deceive the enemy to actual location of the crossing sites.
- You must carefully control the smoke to prevent silhouetting your units or producing a column of smoke that identifies crossing sites. Begin making smoke prior to conducting the initial assault to confuse the enemy as to the actual location and size of the force. Use projected-smoke means to deliver the initial screening smoke to isolate the exit bank objectives and give other smoke delivery means time to build effective smoke.

RETROGRADE OPERATIONS

A retrograde operation is a movement to the rear or away from the enemy. Retrograde operations gain time, preserve forces, avoid combat under undesirable conditions, or draw the enemy into an unfavorable position. Synchronization is the overriding imperative. In retrograde operations the considerations for smoke use are --

- Use screening smoke to conceal maneuver and obstacle emplacement.
- Use smoke along withdrawal routes and along the flanks to conceal movement. Begin making smoke prior to departing your existing position to confuse the enemy as to the actual location and size of the force. Use projected means to deliver smoke between the delaying unit and the enemy force.
- Use smoke to conceal obstacle breaching or crossing. The priority of effort is to mobility operations; therefore, carefully control the smoke to prevent slowing or silhouetting your units.
- Conceal designated withdrawal routes, traffic control points, and on-order assembly areas.
- Create opportunities to disengage the force.

RELIEF IN PLACE

In a relief in place, a unit in contact is replaced by another that assumes the missions of the outgoing unit. Synchronization is the overriding imperative. In relief in place operations the considerations for smoke use are--

- Deny the enemy reconnaissance force information about the disposition, composition, or intent of friendly forces.
- Conceal the movement of relieving forces. This is critical as dispersion of forces in a relief is difficult. The enemy may exploit the massing as a time to attack with NBC weapons.
- In planning the relief, attempt to duplicate patterns of employment for a brief period.
- Use smoke in the reserve force area and along the flanks to conceal movement.
- Use smoke forward of the FLOT to allow the relieved force to disengage. You must carefully control the smoke to prevent silhouetting your units.

LINKUP OPERATIONS

Two friendly forces are joined in linkup operations. Units conduct linkup operations to complete an encirclement of an enemy force, assist in breakout of an encircled friendly force, or to join an attacking force with a force inserted into the enemy rear. Synchronization is the overriding imperative. In linkup operations the considerations for smoke use are--

- Conceal movement of the linkup force.
- Mark bypass routes.
- Signal forces to consolidate on a particular objective or rally point.
- If the enemy has known or suspected nuclear or directed-energy weapon capability, concealing logistics activities in oil smokes may attenuate some of the energy.

BREAKOUT FROM ENCIRCLEMENT

A breakout from encircled forces differs from other attacks only in that units must maintain a simultaneous defense of other areas of the perimeter. In breakout from encirclement operations the considerations for smoke use are --

- Obscure the rupture objective.
- Screen the flanks of the rupture force as they bypass, breach, or cross obstacles or small pockets of resistance.
- Smoke danger areas and the flanks of the force to limit enemy observation and engagement.

FIXED SITE SUPPORT

When providing smoke support to a fixed site, a smoke platoon may operate independently or as part of a company operation. The size of the installation will influence the size of the supporting smoke force.

Primary and alternate smoke positions are selected around the installation. The primary smoke position or line is base on the prevailing wind direction. The leadership of the smoke platoon conducts a careful reconnaissance of each smoke position and line. If possible, smoke is actually generated to test the plan.

Smoke screens in support of fixed facilities are typically long duration operations. This requires extensive prestocking of supplies at both the primary and alternate smoke lines.

Communications is maintained with the supported facility. The smoke platoon leader occupies a smoke control point that will allow observation of the facility.

REAR AREA PROTECTION

The smoke platoon may be directed to conduct combat operations against rear area threats. A mechanized smoke platoon has more fire power and survivability that most combat support and service support units operating in the rear. Even a motorized smoke platoon has significant fire power and mobility. A smoke platoon can defeat a level I and II level rear area threat. A smoke platoon cannot defeat a level III threat, but could delay a level III threat until a combat force arrives.

While providing rear area protection is not a primary mission for a smoke platoon, the platoon must be prepared to assume this type of mission. The platoon leadership must be familiar with fire control and distribution. Vehicle identification skills are extremely important to prevent fratricide.

BREACHING OPERATIONS

Suppress, obscure, secure, and reduce (SOSR) are the breaching fundamentals that must be applied to ensure success against a defending enemy. These fundamentals are applied to the in-stride, deliberate, assault and covert breaches. Use smoke in obscuration to:

- Hamper enemy observation and target acquisition.
- Conceal friendly activities and movement.

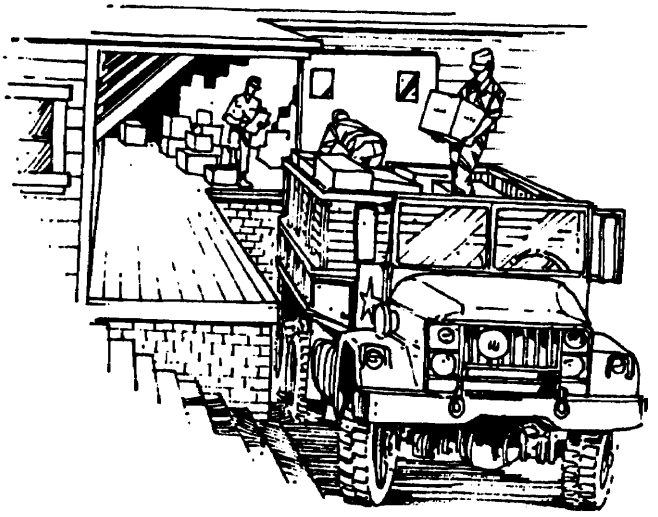
Obscuration smoke deployed on or near the enemy position minimizes its vision. Screening smoke employed in the breaching area or between the breaching area and the enemy conceals movement and obstacle-reduction activities. Obscuration must be employed to protect obstacle reduction, passage of assault forces, and deployment of forces in assault formations. Obscuration must be carefully planned to provide maximum degradation of enemy observation and fires, but it must not significantly degrade friendly fires and control.

The optimal locations for smoke in support of breaching operations is between the obstacle being breached and the enemy force covering the obstacle or directly on the enemy force (obscuring smoke). Smoke placed directly on the obstacle or on the breach force hinders the speed and efficiency of the operation. Smoke units, depending on the steering winds can be used to isolate the breaching operation from the enemy. Indirect fire systems place smoke on enemy positions. This type of operation requires coordination to synchronize all smoke systems. A smoke control point is required to provide positive control of smoke operations in the breaching area.

See FM 90-13-1, *Breaching Operations* for more detail.

DECONTAMINATION SITE RECONNAISSANCE

A smoke platoon could be assigned the task of reconnoitering designated decon sites to determine their suitability. FM 3-5, *NBC Decontamination,* provides general guidance on the selection of decon sites. If possible, the platoon should provide a detailed sketch map of the site. If possible, the nearest location for water should be determined.



CHAPTER EIGHT
LOGISTICS

This chapter discusses the aspects of logistics that affect smoke units. Essentially, logistics keeps forces mobile, fed, armed, clothed, maintained, and supplied for combat operations. Like any other unit, smoke units require all classes of supply (classes I through IX).

In future combat, US Army forces probably will not have the amount of time they had to prepare for the 1991 Persian Gulf War. The very meaning of the phrase "combat readiness" implies being prepared today to tight tonight. To realize the potential of smoke on the battlefield, the smoke unit leader must support his operations with robust, flexible, self-sufficient sustainment systems. The NBC environment provides unique challenges for leader at all levels, but there are few challenges as big as sustaining a force under NBC conditions. Not only must the leader anticipate support needs, integrate support for every phase of the operation, preclude interruption of sustainment functions, prepare sustainment systems for the surge that accompanies a crisis, and complement anticipation with improvisation - the leader must do so under the degradation that accompanies the NBC environment.

NBC CONDITIONS AND LOGISTICS

Degradation of logistic operations primarily results from the physiological and psychological impact of encapsulation in MOPP gear. Tests and lessons learned at the Combat Training Centers, from Operations DESERT SHIELD and DESERT STORM, and from the Combined Arms in a Nuclear/Chemical Environment (CANE) program have shown that logistic operations are seriously degraded while wearing MOPP 4 versus the battledress uniform:

- Vehicle recovery takes 1/3 longer when in MOPP 4.
- Changing vehicle power packs takes 2/3 longer when in MOPP 4.
- Re-fueling operations takes longer in MOPP 4.
- Re-arming takes longer in MOPP 4.
- Most logistic activities require more time when the unit is in MOPP 4.

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LOGISTICS PLANNING

The company headquarters plans, coordinates, and executes logistic functions for the company. The platoon leader is responsible for logistics, just as he is for everything that relates to his platoon. He constantly stays abreast of the platoon's logistic status and, along with the platoon sergeant, plans and executes logistic. The platoon sergeant, however, carriers the bulk of this load. He consolidates information from the squad leaders, and they can delegate some functions to their team leaders. SOPs should address additional responsibilities and duties in detail. They should standardize as many of the routine and recurring logistic operations as possible.

In general, the commander will require assistance to: establish a good command supply discipline program; promote aggressive maintenance and test, measurement and diagnostic equipment (TMDE) programs; support the surgeon in keeping immunizations and physicals up to date; and keep visibility up through periodic checks. Guidance will help subordinate unit leaders ensure that they acquire, store, maintain, man, and protect the systems required for total unit readiness.

Key considerations:

- Plan alternate positions for logistic activities.
- Unlike cross-attached combat arms companies, chemical elements will not have an organic CSS slice.
- Simple supply and services plans work best - be aware that NBC conditions can foul up the best plans, and complexity adds to the confusion.
- Plan materials to cover supplies to prevent/reduce contamination.
- Plan to assign maintenance crews based on the buddy system - check that no one works alone.
- Plan work/rest cycles and frequent checks to prevent accidents.
- Rehearse vehicle recovery plans in MOPP 4.
- Plan for the conduct of frequent serviceability checks on equipment.
- Plan for road guides or MPs to clearly mark and control main supply routes.
- Plan time to rehearse logistics packages (LOGPAC) operations, particularly movement in MOPP 4 from the BSA/trains to the supported unit.

The key preparatory actions to conduct sustainment functions are training, enforcing unit and soldier compliance with plans and SOPs, and command interest. Check to ensure subordinate unit leaders are enforcing the command water plan, the sleep plan or any other aspect that will help to prevent avoidable casualties.

Base planning considerations for logistics on filling unit needs under the six tactical logistics functions shown below.

Tactical Logistics Functions
Manning
Arming
Fueling
Fixing
Moving
Sustaining Soldiers and Their Systems

MANNING

The platoon manning functions are strength accounting and casualty reporting. The platoon leader and NCOs are also responsible for handling EPWs and for the programs to counter the impact of stress and continuous operations.

STRENGTH ACCOUNTING

Leaders in the platoon use battle rosters to keep up-to-date records of their soldiers. They provide strength figures to the company at specific intervals. During combat, they provide manual strength reports upon request or when important strength changes occur.

CASUALTY REPORTING

As soon as the tactical situation allows, platoons give casualty information to the company headquarters using a DA Form 1155, Casualty Feeder Report/Witness Statement. If the form is not available at the time, DA Form 1155 information may be sent in any format by fastest means available. Soldiers with direct knowledge of an incident must also complete a DA Form 1155, Casualty Feeder Report/Witness Statement. This form is used to report soldiers who are KIA, MIA, or WIA. The platoon sergeant reviews these forms for accuracy, then forwards them to the company headquarters. Platoon leaders must stress the confidentiality of casualty information to their soldiers and ensure that casualty information is processed only through official channels.

ARMING

All weapons systems must have a basic load of ammunition. Leaders must insure their soldiers have sufficient ammunition to protect themselves. Coordination with the support unit is critical to replenish Class V after the conclusion of a mission and prior to the execution of another mission. It may be necessary to cross level ammunition immediately after an engagement to ensure that all crews can protect themselves.

FUELING

Without fuel and fog oil the platoon can not perform it’s mission. The mobility of the platoon is dependent on the availability of Class III. Smoke operations is dependent on the availability of fog oil. It is essential that all leaders monitor their fuel and fog oil consumption and make the necessary arrangements for refueling their vehicles. Crews must take advantage of every opportunity to refuel, regardless of the amount of fuel they have on board.

FIXING

Since smoke units do not have sufficient organic logistics to sustain combat operations, they must rely upon divisional or corps CSS assets for maintenance support. The source of maintenance support will normally follow the nature of the moke unit's deployment role. If the smoke unit is deployed in a direct support role, support will normally be provided by intermediate direct support maintenance (IDSM) resources. If the smoke unit is deployed in a general support role or OPCON, maintenance will normally be provided through intermediate general support maintenance (IGSM) resources. If the smoke unit is attached to the maneuver brigade, maintenance support should be provided by the divisional forward support battalion (FSB) that supports the brigade. In planning for the maintenance support of a smoke unit, it is essential that the plan specify --

- The smoke unit deployment role (direct support (DS), general support (GS), attached).
- Support relationship between the maneuver unit and smoke unit.
- Which activity assets (that is, corps support command (COSCOM), division support command (DISCOM), MSB, FSB) will be used to provide maintenance support.
- “Tailoring” of the CSS unit providing maintenance support to meet the mission requirements of the smoke unit.

Smoke unit leaders must coordinate closely with the parent unit commander and the supported maneuver brigade S4 to ensure adequate maintenance support.

Proper maintenance is the key to keeping equipment and material in working condition. It includes inspecting, testing, servicing, replacing, repairing, requisitioning, recovering, and evacuating.

Maintenance operations generally have very high rates of work. Under NBC conditions, maintenance is extremely strenuous. Heavy work also can result in the loss of MOPP gear integrity (e. g., suit separation at the waist, neck or wrists; gloves get torn or pulled off). Plan for additional time and use work/rest cycles to the fullest.

The platoon leader/platoon sergeant is responsible for the maintenance practices within his unit. He must coordinate his platoon's maintenance efforts with the XO to ensure that the platoon is acting IAW the company maintenance effort. The platoon sergeant coordinates and supervises the maintenance of the platoon equipment.

Platoon communications equipment in need of repair is turned into the company communications chief. Platoon weapons and other equipment are recovered to the platoon or the company collection points during battle, or turned in to the supply sergeant after the battle.

All soldiers must understand how to maintain their individual and squad weapons and equipment IAW the technical manuals. The platoon leader, platoon sergeant, and squad leaders must understand maintenance for each piece of equipment in the platoon. The platoon SOP should specify maintenance periods (at least once a day in the field) and standards for equipment and who inspects which items (usually the squad leader, with spot checks by the platoon sergeant and platoon leader).

MOVING

Land navigation under NBC conditions is seriously degraded, particularly at night. Plan for more transport time for material, more fuel (because transportation assets/LOGPACs tend to get lost), and movement controls to minimize the impact on your operations.

SUSTAINING SOLDIERS AND THEIR SYSTEMS

Base planning considerations for sustainment on filling soldier needs through personnel services, health services, field services, quality of life, and general supply support.

Sustainment Functions Systems
Personnel Services
Health Services
Field Services
Quality of life
General Supply Support

PERSONNEL SERVICE SUPPORT

Platoon leaders coordinate personnel service support provided by the battalion (or Task Force) S1, personnel services NCO and chaplain through the company headquarters. Personnel service support includes personnel services (such as mail, awards and decorations, leaves and passes, welfare, and rest and relaxation), financial matters, command information, religious activities, legal assistance, and any other services related to the welfare and morale of the soldiers. Many services are standard procedure. The platoon leader/platoon sergeant must ensure that these services are available to the platoon.

Personnel Sustainment

Leaders must consider visibility constraints and heavy work rates during smoke missions. During operations in an NBC environment, individual protective equipment (IPE) requirements present special problems. Heat buildup becomes critical to the welfare of the soldiers. This is especially true when the operators of the M157 smoke generator set are "buttoned-up" inside the M1059 mechanized smoke generator in IPE. Since smoke generator crews may be difficult to replace in future conflicts, it is important that smoke unit personnel be maintained at peak combat effectiveness. Leaders are the key to maintaining strength and spirit in the unit. Leaders must give special consideration for combat critical functions of personnel service support to include--

- Strength accountability.
- Casualty reporting.
- Replacement operations.
- Health services support.
- Administrative support.
- Discipline.
- Stress management.
- Morale and welfare activities.

The supported maneuver unit G1/S1 and the smoke unit leaders should thoroughly rehearse and coordinate personnel sustainment activities prior to execution of a deployment plan.

HEALTH SERVICES

Divisional level health services support is provided by medical companies of the DISCOM MSB and FSBs. The MSB medical company provides support to all units operating in the division support area (DSA) and backup support to the FSB medical companies. The forward support medical companies provide health services in support of the maneuver brigades and area support to all units operating in the BSA. The smoke unit leaders should coordinate with the supported unit's Sl/G1 and medical support staff on standing operating procedures for health services support. Especially critical to smoke unit leaders is the location of the supported unit's aid station and ambulance transfer point.

Platoon health services support consists of prevention, treatment, and evacuation of casualties. Prevention is emphasized; soldiers can lose their combat effectiveness because of disease or non-battle injury. Understanding and applying the principles of field hygiene and sanitation, preventing environmental injuries (heat and cold), and considering the soldier's overall condition can eliminate many casualties. (See FMs 21-10 & FM 21-11.)

The platoon SOP should address casualty evacuation procedures in detail. It must clearly state that personal protective equipment remains with and is evacuated with the casualty. The casualty's weapon and equipment are retained by the platoon, redistributed as appropriate (ammunition, food, water, special equipment) or evacuated to the field trains by back-haul at the next LOGPAC. Machine guns, M203s, and other special weapons are never evacuated but are reassigned to other soldiers in the unit.

The platoon SOP should include the following:

- Duties and responsibilities of key personnel in planning and executing casualty evacuation.
- Priorities of evacuation.
- Provisions for retrieving and safeguarding weapons, ammunition, and equipment.
- Location of casualty collection points (battalion, company, platoon).
- Procedures and responsibilities for medical evacuation.
- Planned use of non-medical transportation assets for evacuation.
- Procedures for treating and evacuating EPWs and civilian casualties.

Leaders Checks for Health and Welfare

- Plan immunizations on the unit long range training plan - enforce 100% compliance.
- Plan physicals on the unit long range training plan - soldiers must be ready to deploy, and be physically fit.
- Issue individual medications when authorized (e.g., Nerve Agent Pretreatment Tablets; Mark I Nerve Agent Antidote Kits; Convulsive Antidote for Nerve Agent (CANA)).
- Check immunizations and physicals before deployment and upon receiving replacements.
- Ensure units are conducting proper field sanitation and hygiene measures.
- Check for shaves and clean uniforms, socks and boots.
- Check for proper waste disposal.
- Check for properly prepared foods.
- Ensure soldiers are maintaining a high level of physical fitness.
- Ensure the issue of a health pack to each soldier based on the medical threat (e.g., foot powder; iodine tablets).

Casualty Treatment

Leaders must be prepared to provide first aid and evacuate casualties. They must understand the plan for casualty evacuation and immediately begin to evacuate once casualties occur. If medical personnel are not available, the combat lifesavers and the leaders in the platoon must be prepared to evacuate, administer first aid, and evacuate casualties. Seriously injured casualties must be stabilized, within the unit's personnel capabilities, before evacuation to the designated casualty collection point. The supporting unit's health service support plan (including the medical evacuation plan) must be in place and used. Ground ambulances from the supporting medical element should pick up casualties as far forward as the tactical situation permits. In a mass casualty situation (or in a situation where medical evacuation vehicles are not available), any vehicle returning to the vicinity of the medical treatment facility can be used to transport the casualties.

At least one soldier in each smoke squad must be trained as a combat lifesaver to administer enhanced first aid and help evacuate casualties. The combat life savers provide first aid until medical personnel can treat the casualties. they may assist medical personnel in caring for injured soldiers, if the tactical situation permits.

Combat life saver procedures are normally begun at the conclusion of an engagement or during the reorganization of the platoon/squad. Casualties are provided first aid in the form of self-aid, buddy aid, or combat lifesaver procedures. Treatment is provided by the combat medic; after treatment the patient is evacuated to the patient collecting point or is evacuated to the medical treatment facility by ground ambulance. The patient collecting point is chosen by the supporting unit. When selecting the patient collecting point, consideration is given to cover and concealment, security, space in which to treat patients, and access to evacuation routes. KIAs are not collected in or near the patient collecting points.

Casualty Evacuation (MEDEVAC)

The platoon can use any of several means to evacuate the casualties directly to the planned patient collecting point or directly to the medical treatment facility.

The casualties can be moved by vehicles or litter teams to the supported unit's patient collecting point for evacuation. The OPORD should state how the unit plans to move the casualties to the patient collecting point.

In the absence of medical personnel, the platoon sergeant/squad leader can direct litter teams to carry the casualties to the patient collecting point.

Casualties with minor wounds can either walk by themselves or help carry seriously wounded soldiers to the patient collecting point.

In rough terrain, casualties may have to be evacuated by litter teams until transportation can reach them or directly to the medical treatment facility. In some circumstances, casualties may have to be held in a secure location and picked up later by evacuation litter teams/ambulances.

Fatalities are evacuated by backhaul on supply or other vehicles, not by ground or air ambulances.

Table 9-1 provide the format for requesting MEDEVAC.

Table 9-1. MEDEVAC Format

LINE	ITEM	EXPLANATION	WHERE/ HOW OBTAINED	WHO NORMALLY PROVIDES	REASON
1	Location of pickup site	Encrypt the grid coordinates of the When using the DRYAD Numeral Cipher, the same "SET" line will be used to encrypt the grid zone letters and the coordinates. To preclude misunderstanding a statement is made that grid zone letters are included in the message (unless unit SOP specifies its use at all times).	From map	Unit leader(s)	Required so evacuation vehicle knows where to pick up patient. Also, so that the unit coordinating the evacuation can plan the route for the evacuation vehicle (if the evacuation vehicle must pick up form more than one location).
2	Radio frequency, call sign, and suffix	Encrypt the frequency of the radio at the pickup site, not a relay frequency. The call sign (and suffix if used) of the person to be contacted at the pickup site may be transmitted in the clear.	From SOI	RTO	Required so that evacuation vehicle can contact requesting unit while enroute (obtain additional information or change in situation or directions).
3	Number of patients by precedence	Report only applicable information and encrypt the brevity codes. A - URGENT B - URGENT SURG. C - PRIORITY D - ROUTINE E - CONVENIENCE If two or more categories must be reported in the same request, insert the word "BREAK" between each category.	From evaluation of patient(s)	Medic or senior person present	Required by unit controlling the evacuation vehicles to assist in prioritizing missions.

Table 9-1. MEDEVAC Format (continued)

LINE	ITEM	EXPLANATION	WHERE/ HOW OBTAINED	WHO NORMALLY PROVIDES	REASON
4	Special equipment required	Encrypt the applicable brevity codes. A - None. B - Hoist. C - Extraction equipment. D - Ventilator.	From evaluation of patient(s)/ situation	Medic or senior person present	Required so that the equipment can be placed on board the evacuation vehicle prior to the start of the mission.
5	Number of patients by type	Report only the applicable information and encrypt the brevity code. If requesting MEDEVAC for both types, insert the word "BREAK" between litter entry and ambulatory entry. L + # of Pnt - Litter A + # of Pnt - Ambulatory (sitting)	From evaluation of patient(s)	Medic or senior person present	Required so that the appropriate number of evacuation vehicles may be dispatched to the pickup site. They should be configured to carry the patients requiring evacuation.
6	Security of pickup site (wartime)	N - No enemy troops in area. P - Possible enemy troops in area (approach with caution) E - Enemy troops in area (approach with caution) X - Enemy troops in area (armed escort required)	From evaluation of situation	Unit leader	Required to assist the evacuation crew in assessing the situation and determining if assistance is required. More definitive guidance can be furnished the evacuation vehicle while it is enroute (specific location of enemy to assist an aircraft in planning its approach).
6	Number and type of wound, injury, or illness (Peacetime)	Specific information regarding patient wounds by type (gunshot or shrapnel). Report serious bleeding, along with patient blood type, if known.	From evaluation of patient	Medic or senior person present	Required to assist evacuation personnel in determining treatment and special equipment needed.
7	Method of marking pickup site	Encrypt the brevity codes. A - Panels. B - Pyrotechnic signal. C - Smoke signal. D - None. E - Other.	Based on situation and availability of materials	Medic or senior person present	Required to assist the evacuation crew in identifying the specific location of the pickup. Note that the color of the panels or smoke should not be transmitted until the evacuation vehicle contacts the unit (just prior to its arrival). For security, the crew should identify the color and the unit verify it.

Table 9-1. MEDEVAC Format (continued)

LINE	ITEM	EXPLANATION	WHERE/ HOW OBTAINED	WHO NORMALLY PROVIDES	REASON
8	Patient nationality and status	The number of patients in each category need not be transmitted. Encrypt only applicable brevity codes. A - US military. B - US civilian. C - Non-US military. D - Non-US civilian. E - EPW.	From evaluation of patient	Medic or senior person present	Required to assist in planning for destination facilities and need for guards. Unit requesting support should ensure that there is an English speaking representative at the pickup site. Required to assist evacuation personnel in determining treatment and special equipment needed.
9	NBC contamination (wartime)	Include this line only when applicable. Encrypt the applicable brevity codes. N - Nuclear B - Biological. C - Chemical	From situation	Medic or senior person present	Required to assist in planning for the mission. (Determine which evacuation vehicle will accomplish the mission and when it will be accomplished.)
9	Terrain description (peacetime)	Include details of terrain features in and around proposed landing site. If possible, describe relationship of site to prominent terrain feature (lake, mountain, tower)	From area survey	Personnel at site	Required to allow evacuation personnel to assess route/avenue of approach into area. Of particular importance if hoist operation is required.

FIELD SERVICES

Field service provide the basics for soldiers while in the field. Field services consist of food preparation, water purification, clothing repair, tactical showers, mortuary affairs, and rigging equipment for airdrop. Smoke unit leaders must be aware of the location of these services on the battlefield and use them as necessary.

QUALITY OF LIFE

Quality of life and family considerations directly affect a soldier's readiness and willingness to fight. Leaders must ensure that their soldiers quality of life is sustained through effective personnel, health, and field services. Because of the nature of smoke unit operations, delivery of mail may be delayed. leaders must ensure that coordination is accomplished to ensure that their soldiers receive their mail in the most timely manner possible. Art effective command information program is critical component to sustaining a soldier's morale.

GENERAL SUPPLY SUPPORT

Supply is the process of providing all items necessary to equip, maintain equipment, and operate the unit. It involves the procurement, storage, distribution, maintenance, and salvage of supplies.

There are two methods of procuring supplies:

- On hand supply point distribution. The unit uses its organic transportation to pick up supplies from distribution points.
- On hand unit distribution. Supplies are delivered to a unit by transportation assets other than its own.

Units always maintain some combat essential supplies on hand either transported or organic combat or support vehicles. These on hand stocks include basic loads and prescribed loads.

Supplies are divided into ten classes for supply management and planning.

Table 9-2. Classes of Supply

SUPPLY CLASS	DEFINITION
I	Subsistence items, gratuitous health and welfare items
II	Items of equipment other than major end items
III	Petroleum, Oil, And Lubricants (POL)
IV	Construction and barrier materials
V	Ammunition
VI	Personal demand items normally sold through exchange
VII	Major end items
VIII	Medical material
IX	Repair parts and components. (Class IXa is aviation-peculiar products)
X	Material to support nonmilitary programs
Miscellaneous	Water, maps, captured material, and salvaged material

SUPPLY OPERATIONS

Squad leaders must know the supply status for each member of the squad. As materials and supplies are used, squad leaders request supply through the platoon sergeant. Platoon and squad SOPs should establish levels of depletion for specified items of supply (for example, water, ammunition). All soldiers and leaders should report supply status once that level of depletion is reached.

The platoon sergeant combines requests from all squads and forwards them to the Chemical Company 1SG or XO, and to the logistics officer (S4) of the unit the platoon is supporting. There is no administrative/logistic net for the platoon. Logistics reports, when required, are sent to the commander. Most supply requests take a lot of time to

transmit. Line numbers should be to assigned to supply items to save time. When operating on a non-secure radio net, the platoon sergeant should encode all requests. The request is filled then or during the next supply operation, depending on the urgency.

One of the most critical supply functions is water. Even in cold areas, all personnel must drink at least two quarts of water a day to maintain efficiency. Water can be supplied either by collecting and filling empty canteens or distributing water cans to the platoons.

- Leaders must urge soldiers to drink water when not thirsty. This is due to the body's thirst mechanism, which does not keep pace with the loss of water through normal daily activity. The rate at which dehydration occurs will depend on the weather conditions and the level of physical exertion.

- If water is in short supply, soldiers must use water sparingly for hygienepurposes. When in short supply, water should not be used to heat MREs. Water used for coffee or tea may also be counterproductive because both increase the flow of urine. However, soups are an efficient means of providing both water and nutrition when water is scarce, particularly in cold weather when heated food is desirable. A centralized heating point can be used to conserve water, yet provide warmed MREs.

- In most environments, water is available from natural sources. Soldiers should be trained to find, treat (chemically or using field expedients), and use natural water sources. The use of iodine tablets is the most common and easiest method to treat water. (NOTE: Iodine tablets that are not uniformly gray in color or no longer have a firm consistency should not be used. However, an alternate method of disinfecting the water should be used; such as boiling before drinking.) (See FM 21-10 and FM 21-76 for more information.)

REQUESTS FOR SUPPORT AND ROUTINE SUPPLIES

The command and support relationship that the smoke unit has with a supported unit determines the degree of complexity administration and logistics will have during the operation. Platoon leaders and sergeants, that understand their command and support relationship they are operating under. Additionally, they must conduct prior coordination with the supported unit. Without these two things, it is almost impossible to execute a logistically supportable mission. Sustainment planning is essential for successful mission accomplishment.

Requesting support and routine supplies may or may not be a complex issue. Where the smoke unit will submit its request for support depends on the command and support relationship it is under. The platoon sergeant submits logistics status reports and supply requests to the unit providing logistical support. Maintenance and recovery support are requested the same way as supplies.

During the battle, support will normally be limited to medical and maintenance activities and fog oil resupply. During the battle (offense or defense), the unit will request support from the appropriate unit. It is critical that all smoke unit leaders (down to vehicle commanders) know who is supporting them and where these activities are located on the battlefield (aid stations, unit maintenance collection points, brigade/division support areas, and so forth.),

The smoke unit's supply sergeant is responsible for obtaining and delivering most supplies to the platoon. He delivers small items and may require additional support for bulky or high expenditure items. Priorities for delivery are established by the company commander, but the demands of combat dictate classes I, III, and V supplies as the most critical to successful operations.

RESUPPLY OPERATIONS

Resupply operations can be described as routine, emergency, and prestock. Each method is developed in the company SOP and rehearsed in training. The actual method selected will depend on METT-T and the command and support relationship of the smoke platoon.

Routine resupply operations are regular resupply of classes I, III, V, IX items; mail; and any other items requested by the smoke platoon. Routine resupply will take place at least daily. The smoke platoon should resupply class III at every opportunity. Resupply will normally take place during times of limited visibility. Resupply may occur as a logistics package (LOGPAC) from the parent chemical company or from the supported unit. The smoke platoon may be required to resupply with a subordinate element of the supported unit (that is, a maneuver company or at the main CP). A LOGPAC is a centrally organized resupply convoy originating at the chemical company headquarters or the supported unit's field trains or support activity. The LOGPAC will normally contain all necessary supplies to sustain the platoon for a specific time (usually 24 hours or until the next scheduled LOGPAC).

The chemical company supply sergeant assembles the LOGPAC under supervision of the first sergeant or operations officer. Replacements and soldiers released from medical facilities are brought to the platoon on the LOGPAC vehicles. Once the LOGPAC is prepared for movement, the supply sergeant tactically moves it to the platoons. The LOGPAC may be led by the company first sergeant. The platoon sergeant will normally meet the LOGPAC at an logistics release point (LRP) and guide the LOGPAC to the platoon resupply point. The LRP is an easily recognizable point that the LOGPAC and the supported platoons can identify. Depending on the dispersion of the platoons, several LRPs may be used.

Some times the smoke platoon is resupplied by the supported unit or supplies are carried on the supported units LOGPAC vehicles. If this is the case then the resupply of the smoke platoon is based on the resupply techniques of the supported units LOGPAC.

When the LOGPAC arrives at the platoon's position, the platoon sergeant--

- Turns in routine reports.
- Turns in parts requisitions and the deadline status.
- Picks up routine correspondence and mail.

RESUPPLY TECHNIQUES

Resupply will occur under two different situations: after an operation for routine resupply support and during a smoke operation for class III (fog oil, MOGAS, and diesel).

Resupply Operations During Non-Smoke Operations

For routine resupply operations while not making smoke, the platoon will use either the out-of-position (service-station) or in-position (tailgate) techniques. The platoon leader determines the technique to be used and informs the platoon sergeant. The resupply technique used depends on the tactical situation. The platoon sergeant briefs the LOGPAC or fuel support leader on the technique to be employed.

Service-Station Resupply. The LOGPAC or support squad establishes a resupply point. Each vehicle in the platoon then moves to the resupply point. All resupply activities occur at the resupply point. (See figure 8-1.)

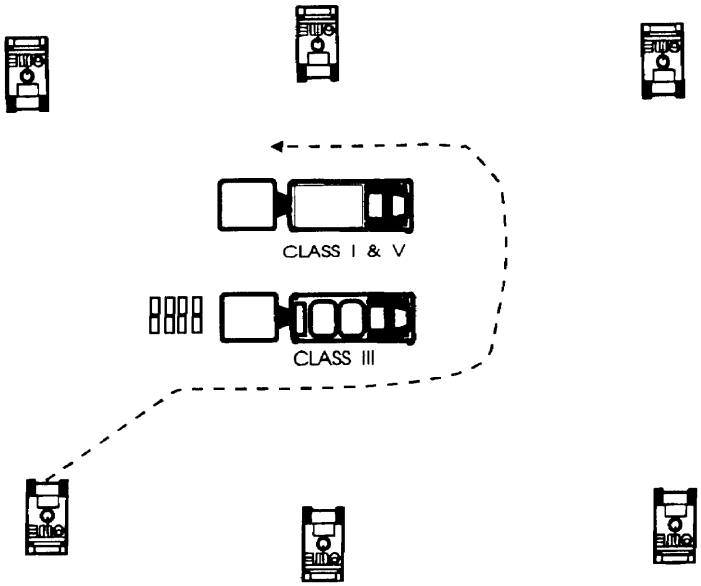


Figure 8-1. Service-Station Resupply.

Tail-Gate Resupply. The LOGPAC or support squad moves from vehicle to vehicle in the platoon area. Each vehicle in the platoon is resupplied with all required items; water, fuel, food, and ammo. This is the fastest method of resupply. (See figure 8-2.)

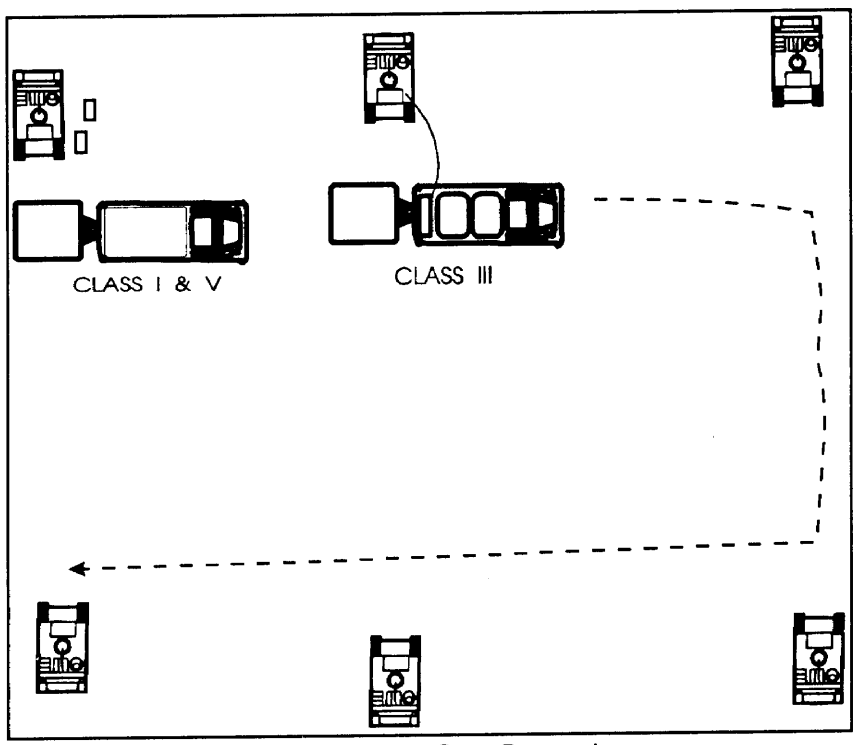


Figure 8-2. Tail-Gate Resupply.

Resupply Operations During Smoke Operations

There are two techniques for resupply during smoke operations: on-line resupply and off-line resupply. Only supplies necessary for the maintenance of the smoke screen will be resupplied during a smoke operation. The platoon leader determines the technique to be used and informs the platoon sergeant. The resupply technique used depends on the tactical situation. The platoon sergeant briefs the support squad leader on the technique to be employed. He also notifies the smoke platoon when they are ready.

On-line Resupply. Stationary smoke points are resupplied on line during a smoke mission. This requires the support squad to move to each point as needed. There are two procedures for on-line resupply: fuel-and-move and drum drop.

- Fuel-and-Move. Fuel-and-move is a best procedure of on-line fuel resupply for mobile smoke systems (that is, M1059s and HMMWV-mounted generators). When using the fuel-and-move procedure, the support squad moves its tank and pump units (TPUs) to the smoke line and refuels each smoke system in turn. The procedure for fuel-and-move is as follows--

•• The support squad leader links up with the smoke squad leader at a prearranged linkup point. The smoke squad leader ground guides the support squad to the smoke squad's positions. One crew fuels at a time while the other crews maintains security.

•• The fuel supply squad moves with the fog oil/MOGAS vehicle (vehicle 1) in the lead and the diesel vehicle (vehicle 2) in trail.

•• Smoke vehicle commanders will dismount and ground-guide the fog oil/MOGAS vehicle into refueling position (figure 8-3). Refueling position places the fuel vehicle perpendicular to the smoke vehicle. Simultaneously, the generator operator will prepare the system for refueling (for example, lower tailgate, drop amp, open fuel tank). See Appendix F for safety guidance.

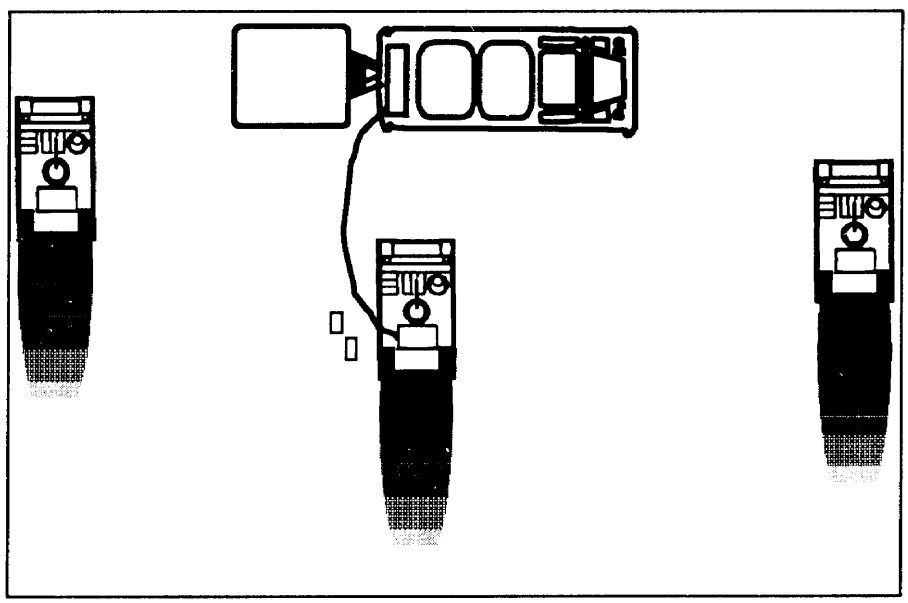


Figure 8-3. On-line Resupply.

•• The fuel handler will dispense fog oil into the fog oil tank. Simultaneously, the vehicle commander will exchange empty can of MOGAS for full cans and reconnect them to the generator.

•• When refueled with fog oil and MOGAS, the smoke squad leader ground-guides the fog oil/MOGAS vehicle to the next crew position. Simultaneously the smoke vehicle commander ground-guides the diesel vehicle into proper refueling position. The fuel handler then dispenses diesel into the smoke vehicle.

•• When refueled, the smoke crew assumes security for the next crew, and signals the fuel squad leader to begin fueling at the next position.

The process continues until all vehicles are refueled.

NOTE

Personnel on the ground must stand well away from the rear of the truck when the fuel handler is dropping drums.

• Drum Drop. The drum drop is a procedure of on-line fuel resupply that is appropriate for stationary smoke systems (that is, M3A4 Smoke Generator mounted on the M998 HMMWV or M151-series truck). When using the drum drop procedure, the support squad moves one cargo truck to the smoke line and drops fog oil drums at each position. The support squad then refuels diesel and MOGAS for each smoke system in turn. The procedures for the drum drop technique are as follows--

•• The support squad leader links up with the smoke squad leader at a prearranged linkup point. The smoke squad leader ground-guides the fuel supply squad to the smoke squad's positions.

•• The support squad moves with the fog oil vehicle (vehicle 1) in the lead and the diesel/MOGAS vehicle (vehicle 2) in trail.

•• The smoke vehicle commander ground-guides the fog oil vehicle to a position close to (5 meters or less) the smoke vehicle. The fuel handler drops the tailgate on the fuel truck and drops the required number of drums of fog oil to the ground, bung and vent end up.

•• The smoke squad leader then ground-guides the fog oil truck to the next position. Simultaneously, the smoke vehicle commander will dismount and ground-guide the fog oil/MOGAS vehicle into refueling position. Refueling position places the fuel vehicle perpendicular to the smoke vehicle. Simultaneously, the generator operator will prepare the system for refueling (that is, open fuel tank). See Appendix F for safety guidance.

•• The fuel handler will dispense diesel fuel into the diesel fuel tank. Simultaneously, the vehicle commander will exchange empty can of MOGAS for full cans and reconnect them to the generator.

•• When refueled with diesel fuel and MOGAS, the smoke squad leader ground guides the fog oil/MOGAS vehicle to the next crew position.

•• When refueled, the smoke crew assumes security for the next crew, and signals the fuel squad leader to begin fueling at the next position.

The process continues until all vehicles are refueled.

Off-line Resupply. Mobile units are resupplied by rotating individual systems through a fuel resupply point 1 to 2 kilometers to the rear of the smoke line. You also can resupply stationary units that are displacing in this manner. Off-line resupply increases the fuel supply squad's survivability by placing them at less risk of enemy contact and farther from enemy long-range weapon systems. The process for accomplishing off-line resupply is as follows--

- The support squad leader links up with the smoke platoon sergeant at a prearranged linkup point. Simultaneously, the platoon leader issues a warning order that establishes an order for resupply.

- On order, individual smoke vehicles move to the resupply point and refuel.

- The smoke vehicle crew maintains security while the support squad refuels their vehicle.

- The fuel handlers dispense fog oil diesel fuel into the fog oil and diesel fuel tanks, respectively. Simultaneously, the vehicle commander exchanges empty cans of MOGAS for full cans and reconnects them to the generator.

- Once the vehicle is refueled, it returns to the smoke line. The vehicle commander notifies the platoon leader. The next vehicle in the resupply sequence moves to the resupply point.

- For a mobile smoke mission the resupply point will have to displace forward to maintain contact with the unit being resupplied.

The process continues until all vehicles are refueled.

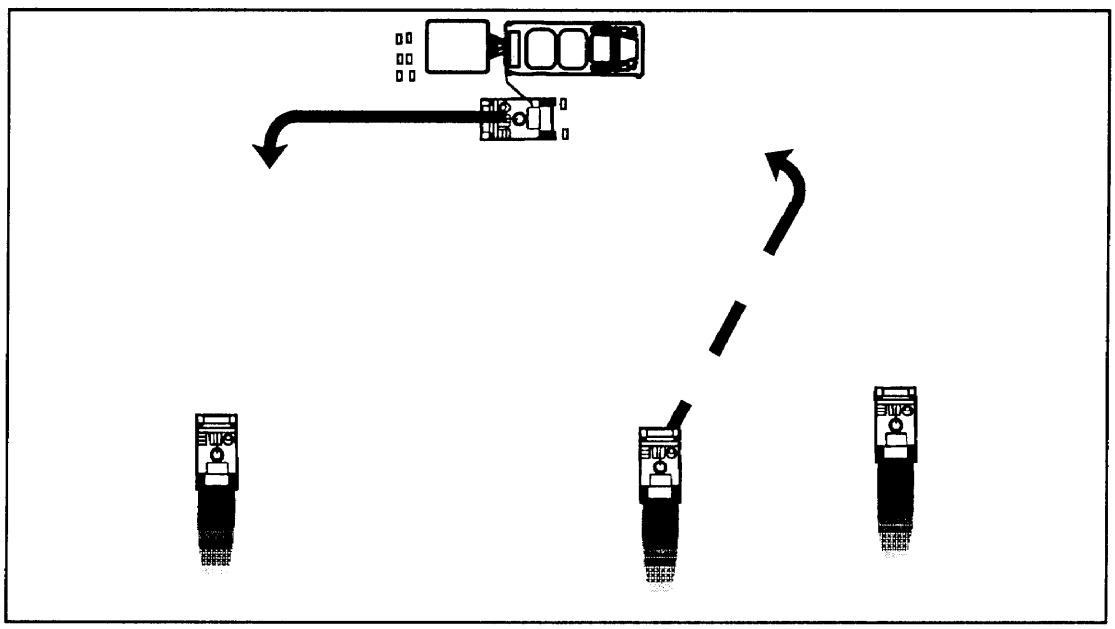


Figure 8-4. Off-line Resupply.

COMBAT LOADS

The platoon should attempt to maintain combat loads as long as possible. Both class III (fog oil, MOGAS, and diesel) and class V (ammunition) resupply is a major problem on the battlefield. Without proper fire discipline, a vehicle or squad can use its entire combat load of class V in one or two engagements, rendering it ineffective during later encounters. Crews must constantly check the on-board supply of class III and class V. Class III and class V reporting procedures should be established as SOP. The platoon leader should prescribe how low on class III and class V the platoon or squads can get before requesting resupply. Elements should not be allowed to drop below this level except in a combat emergency.

PRE-POSITIONING

Pre-positioning is a technique of resupply where supplies are placed on an occupied position to be used at a future time. The location and amount of pre-positioned supplies must be carefully planned and each squad leader informed. The platoon leader must verify the locations of the pre-positioning sites during his reconnaissance and rehearsals. When pre-positioning supplies, consider the following:

- Covered and protected positions are needed for prepositioned ammo.
- Prepositioning frees cargo vehicles and TPUs to return and bring more fog oil and fuel forward.
- The smoke platoon cannot guard the prepositioned supplies and, therefore, risks the capture or destruction of the prepositioned supplies.

Considerations that determine whether or not to restock are normally made at levels higher than the platoon.

FORWARD FUEL SUPPLY POINT

This is an area where the fuel support element stores large quantities of fog oil close to the smoke unit. The area should be in a covered and concealed location. The position should be located near a road for easy access. However, the site should be far enough away from friendly positions to prevent personnel casualties if the position is hit by enemy fire. The site should have a separate entrance and exit.

The support element establishes the forward fuel point based on the anticipated needs of the smoke unit they are supporting. The drums of fog oil should be stored in such a manner that they can be readily uploaded by the TPUs or cargo trucks. The different types of products (fog oil, MOGAS, and diesel) should be separated. Figure 8-5 shows the layout of a typical forward fuel supply point.

Never exceed the load limit of a vehicle. Table 8-1 lists the maximum load limits for specified fuels and cargo vehicles.

Table 8-1.

MAXIMUM LOAD LIMITS FOR SPECIFIC FUELS AND CARGO VEHICLES		
Vehicle	55-gal drum (Fog Oil)	5-gal can (MOGAS)
5-ton truck	18	N/A
2 1/2-ton truck	11	125
1 1/2-ton trailer	6	63

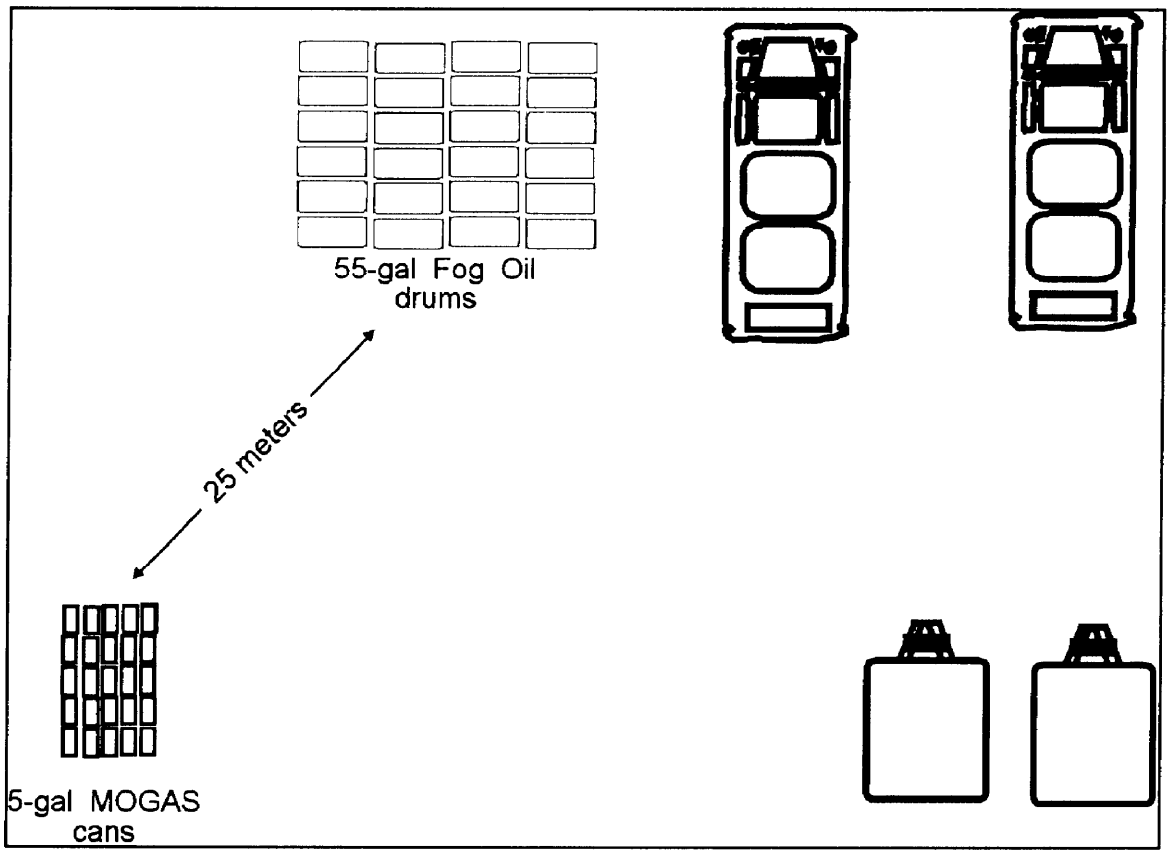


Figure 8-5. Forward fuel supply point.

APPENDIX A
O R D E R S

This appendix discusses the characteristics and formats for warning, operations, and fragmentary orders.

CHARACTERISTICS OF ORDERS

A good order is characterized by the following--

- **Clarity.** Use doctrinally established military terminology to clearly convey identical meanings to all elements that receive the order.
- **Completeness.** The order should contain all the information and instructions necessary to coordinate and execute the operation.
- **Brevity.** Avoid unnecessary detail. Do not sacrifice clarity and completeness in the interest of brevity.
- **Use of the affirmative form.** In the interest of simplicity and clarity, use the affirmative form of expression throughout orders.
- **Avoidance of qualified directives.** Avoid meaningless adverbs and expressions that do not fix responsibility.
- **Authoritative expression.** Avoid indecisive, vague, and ambiguous language that indiates indecision and leads to uncertainty and lack of confidence by subordinates.
- **Timeliness.** Orders must allow subordinate leaders sufficient time for planning apnd preparation.

WARNING ORDER

Warning orders give subordinate units notice of a contemplated action or order that is to follow. The purpose is to initiate the troop-leading procedures of subordinate units. A warning order has no prescribed format. It should, however, be brief and contain as much information as possible to allow subordinates to prepare for the mission. The warning order should be updated as more information becomes available.

CHARACTERISTICS OF ORDER . . . A-1
WARNING ORDER A-1
OPERATIONS ORDER A-2
FRAGMENTARY ORDER A-3
PREPARATION OF SMOKE OVERLAY A-4
TECHNIQUES FOR DISSEMINATING AND PASSING OF ORAL ORDERS A-5
TECHNIQUES FOR DISSEMINATING OF OTHER ORDERS A-5
SMOKE UNIT CHECK LISTS A-6

Basic elements of a warning order are--

- Addressee (who).
- Time and nature of the operation (what).
- Earliest time to move (when)
- Time and place of OPORD.
- Other information as appropriate (such as attachments and detachments).

The platoon leader should send a warning order to his platoon when he receives the supported unit's order. This will allow his platoon to begin preparations while the platoon leader is traveling back to the platoon location.

OPERATIONS ORDER

The platoon leader receives various type of operations orders from the units he supports. They can be written orders, matrix orders, or any mixture of the two. The platoon leader must understand the formatting of operations orders so that he can extract all necessary information.

The platoon leader will issue his order using the five-paragraph field order format (figure A-l). Under normal circumstances the order will be issued verbally to his platoon. Squad leaders and vehicle commanders will copy the graphics from the platoon leader's map.

1. SITUATION. [Information for this paragraph can be obtained from the supported unit's operation order.]

a. Enemy Forces. Contains information concerning employed enemy forces such as composition, disposition, location, movement, estimated strengths, identification, and capabilities.

b. Friendly Forces. Contains information concerning locations and activities of friendly forces which may directly affect or be directly affected by the smoke mission.

c. Attachments and Detachments. Describe any units attached and/or any subordinate units detached to/from the smoke unit. Example: 1st Squad/Support Platoon/84th Chemical Company attached.

2. MISSION. A clear, concise statement of the task to be accomplished by the smoke unit and its relationship to the mission of the supported unit. The mission statement should answer the questions: Who, What, When, Where, and Why.

3. EXECUTION.

Intent: Defines the purpose of the operation, the end state, and how the unit will achieve the end state. This section will describe how the supported commanders sees smoke being used on the battlefield and what he wants it to do. Additionally, the condition of the smoke platoon at the end of operation is also stated.

a. Concept of the Operation. This subparagraph describes how the smoke unit leader visualizes the smoke mission. This portion is normally briefed with the aid of a map overlay and/or terrain board.

Figure A-1. Five-paragraph format for operations order.

b. Coordinating Instructions. This subparagraph includes any special coordinations which must be made within the smoke unit, such as--

(1) Actions at the objective.
(2) Time of departure/time of return.
(3) Method of movement.
(4) Routes.
(5) Alternate routes.
(6) Passage of lines.
(7) Rally points.
(8) Actions on contact.
(9) Actions at danger areas.
(10) Actions at halt.
(11) Fire support.
(12) Security.
(13) ADA warning and weapons status.
(14) Rehearsals.
(15) Inspections.
(16) Priority Intelligence Requirements.

4. SERVICE AND SUPPORT. In this paragraph, state the mission logistical requirements and the plan to meet those requirements. Key items of concern are fog oil, diesel, gasoline, Class I, and Class V. Special instructions for the fuel supply section/platoon are contained in the section.

5. COMMAND AND SIGNAL.

a. Command.

(1) State the location of the smoke platoon leader.
(2) State the location of the smoke control point.

b. Signal.

(1) Start/Stop signals for smoke.
(2) Any other signaling devices or codes required for the mission.
(3) Frequency/Callsign for supported unit key leaders.
(4) Current signal operation instructions (SOI) in effect.

Figure A-1 (continued). Five-paragraph format for operations order.

FRAGMENTARY ORDER

A FRAGO is a brief oral or written order. It serves any of the following purposes--

- It provides timely changes to existing orders.
- It provides pertinent extracts from more detailed orders.
- It provides instructions as a detailed order is developed.
- It provides specific instructions to commanders who do not require a complete order.

There is no specified format for a FRAGO, but it normally contains--

- Changes to task organization.
- Situation.
- Concept.
- Fire support.
- Coordinating instructions.

PREPARATION OF THE SMOKE OVERLAY

The overlay must contain: smoke control point(s), forward fuel resupply points, primary and alternate smoke generator positions, smoke pot locations, indirect fire targets, and any supporting and supported unit graphics. Most importantly, the overlay must specify which subordinate smoke units are responsible for each portion of the smoke screen. A method of doing this follows:

Step 1. Divide the area to be screened into platoon or squad sectors. Positions selected should cover all potential wind directions (360 degrees) which are executable. (At times, the enemy situation will be such that some wind directions will render the mission insupportable by smoke generator assets. When this occurs, maneuver commanders will have to explore other methods, such as artillery- or mortar-delivered smoke). Subordinate smoke units are assigned various sectors. Smoke positions/sectors surrounding the objective should be numbered to allow rapid repositioning of generators. The number of sectors will vary with the size and nature of the target, the number of available smoke assets, and the type of smoke mission conducted.

Step 2. Plot sites previously selected for smoke control points. Existing OPs can be used if they provide satisfactory line of sight and tactical concealment and are satisfactory for communications purposes. (Friendly aerial observers may assist in this effort if available.)

Step 3. Plot lanes (mobile) or the approximate location of individual generators (static), planned fires, supported and supporting elements, fuel supply points, and enemy locations. Shifts in the direction of the wind may cause the smoke control officer to shift assets to alternate numbered positions to continue the mission. The overlay will facilitate this process and avoid confusion. Each leader who has the responsibility to control smoke units should have a copy of the overlay. Figure A-2 is an example of a smoke overlay.

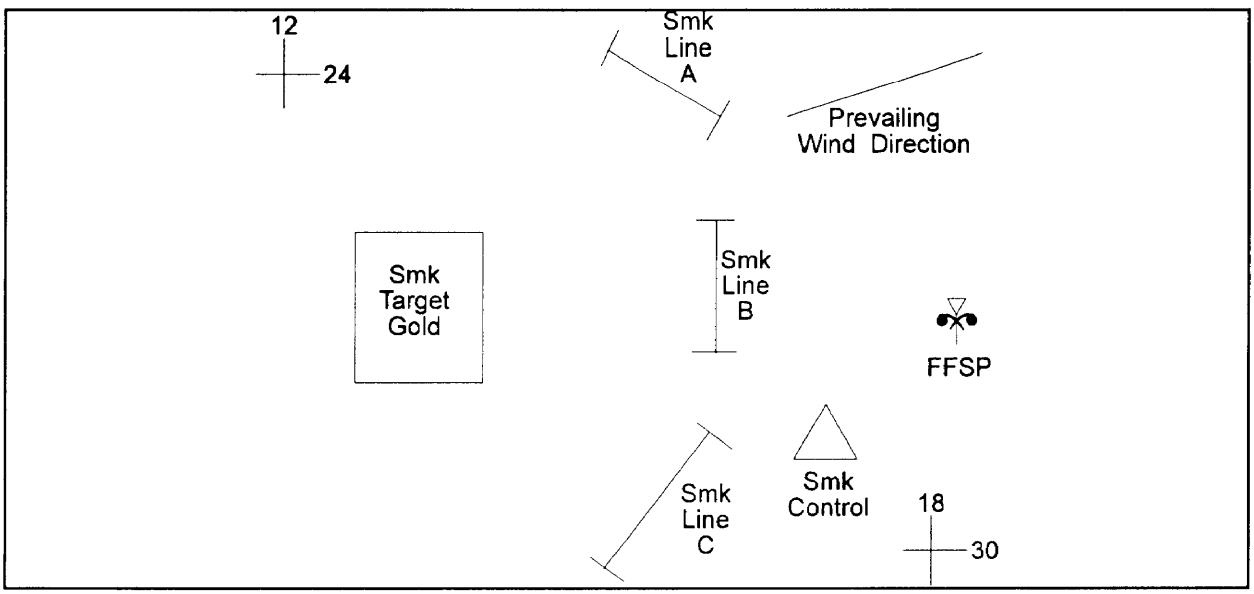


Figure A-2. Example of a smoke overlay (with the supported unit's graphics omitted).

TECHNIQUES FOR DISSEMINATING AND PASSING ORAL ORDERS

RADIO ORDERS

Leaders issue orders over the radio when distance prevents issuing the order face-to-face and time does not allow for written orders. This is the most frequently used method for issuing an order once a operation begins. Radio transmissions must be short to counter the EW threat.

The phrasing of the mission statement is all-important. A commander must choose his words carefully when issuing an order over the radio. Commanders can use the following techniques to issue short but effective radio orders--

- Use mission orders which are concise and emphasize intent.
- Use brevity codes and code words.
- Break the order into short transmissions.
- Use Terrain Index Reference System and other existing control measures.

FACE-TO-FACE ORDERS

Commanders issue orders face-to-face when time does not allow for written orders. The commander uses this method because it has the benefit of command presence and instills his will on his subordinates.

ORDERS GROUP

Commanders issue orders using an orders group when time and situation permit. Key individuals responsible for execution and coordination of the details of the operation must be present. The commander normally uses this method before an operation begins and when there is sufficient planning time.

TECHNIQUES FOR DISSEMINATING OTHER ORDERS

Commanders may use written orders or overlays to augment oral orders, or as a method of passing the order itself.

STAND-ALONE OVERLAY

Commanders use stand-alone overlays when time is available and new graphics are necessary. Overlays should be delivered forward to subordinate commanders by courier unless time allows for an orders group. The commander should include necessary information, such as the task organization (if changed), the mission statement, and commander's intent on or with the overlay.

WRITTEN ORDERS

Commanders normally issue written orders with the overlays as annexes at the beginning of an operation.

SMOKE UNIT CHECKLISTS

SMOKE COORDINATION CHECKLIST

1. What are the grid coordinates of the smoke target area?

2. What are the tactical or operational missions to be supported?

3. What kind of visibility criteria in the smoke target area is required?

4. What type of screening smoke (haze, blanket, or curtain) is required?

5. What type of smoke unit support for logistics, security, and fire support is available?

6. What is the intent/purpose for each smoke target?

7. How will weather and terrain affect the mission?

8. What is the anticipated duration of the tactical or operational mission?

9. What is the direction of known or suspected enemy forces?

10. What are the supported unit's frequencies, call signs, and brevity codes?

11. What are the signals for starting, stopping, shifting, or continuing the smoke mission?

12. What is the tactical situation in the proposed smoke area of operations concerning enemy contact, obstacles, etc?

13. What actions should the smoke unit take upon enemy contact?

14. What are the grid coordinates of supported unit's tactical operations center/command post (tactical operations center (TOC)/CP)?

15. What is the challenge/password?

16. How will fog oil and fuel (both diesel and gasoline) be resupplied to the platoon?

17. How will the platoon conduct resupply during the mission?

18. How will maintenance support be provided?

19. What is the projected requirement for class V?

20. How will casualties be evacuated?

SMOKE RECONNAISSANCE CHECKLIST

1. Locate selected target areas.

2. Determine supported and subordinate unit positions.

3. Designate subordinate unit smoke positions and/or lanes.

4. Locate smoke control point(s).

5. Designate supply routes, access routes, fuel resupply points, and/or fuel/fog oil forward prestock points if required.

6. Determine local weather and terrain conditions. (While it is important to note local weather conditions at the time of the recon, the unpredictable nature of weather necessitates that the smoke unit leader consider all possibilities when drafting the operations order.)

7. Determine security support requirements and internal smoke unit defense measures.

8. Locate communications positions for radio and wire.

9. Determine primary and alternate routes into and out of the area of operation.

10. Determine the location of the forward fuel supply point.

APPENDIX B
TACTICAL ROAD MARCHES AND ASSEMBLY AREAS

TACTICAL ROAD MARCHES

The ground movement of troops can be accomplish by administrative marches, tactical movements, and tactical marches.

Although administrative marches may break up unit integrity, they are used in rear areas where speed and best use of transportation assets expedite movement.

Tactical movements, as described in chapter 4, are used when contact with enemy forces is a possibility.

Tactical marches are normally used to move units from rear areas to assembly areas in preparation for the conduct of a mission. Although a company may be required to conduct a tactical march, the platoon will normally move as part of the supported force.

The tactical march is conducted when speed is essential, unit integrity must be maintained, road nets are available, and enemy contact is limited.

The following definitions apply to tactical road marches and foot marches:

ARRIVAL TIME. The time the head of a column reaches a designated point or line.

CLEARANCE TIME. The time the tail of a column passes a designated point or line.

COLUMN (TIME) GAP. The space between two consecutive elements calculated in units of length (meters) or units of time (minutes), measured from the rear of one element to the front of the following element.

COMPLETION TIME. The time the tail of a column passes the release point.

CRITICAL POINT. A selected point along the route of march used for reference in giving instructions; any point along the route where interference with the troop movement may occur.

TACTICAL ROAD MARCHES B-0
Conduct of the Tactical Road March B-2
ASSEMBLY AREAS B-4
Actions in Assembly Areas B-4

MARCH UNIT. A unit that moves and halts at the command of a single commander--normally one of the smaller troop units such as a platoon or company.

PACE SETTER (VEHICLE). A vehicle in the lead element responsible for regulating speed.

PASS TIME. The time between the movement of the first element past a given point and the movement of the last element past the same point.

RATE OF MARCH. The average kilometers-per-hour traveled.

RELEASE POINT. A well-defined point on a route at which the elements composing a column return to the authority of their respective commanders.

SERIAL. A grouping of march units under a single commander. It is usually a battalion, brigade, or larger unit. For convenience in planning, scheduling, and control, it is given a numerical or alphabetical designation.

START POINT. A well-defined point on a route where the elements of the move come under the control of the movement commander. It is at this point that the column is formed by the successive passing of each of the elements in the column.

VEHICLE DISTANCE. The space between two consecutive vehicles of an element in the column.

ORGANIZATION OF A MARCH COLUMN. Depending on the size and number of units conducting the move, the battalion is normally formed as a serial with companies and elements of headquarters and headquarters company formed into march units. The entire column is organized into an advance party, main body, and trail party. The advance party consists of a reconnaissance element and a quartering party; the trail party is made up of maintenance, recovery, and medical elements; and the main body is made up of the rest of the force.

VEHICLE DISPERSION. The move can be conducted with vehicles traveling in close column, in open column, or by infiltration. The method to use is determined by the degree of control required to maintain a cohesive unit, and by the terrain that is being traveled, for example, open terrain requires more dispersion than close terrain.

In close column, vehicles are spaced approximately 25 meters apart during daylight. At night, and during reduced visibility, vehicles are spaced so that the driver and vehicle commander can see the two lights in the blackout marker of the vehicle ahead, if not the vehicle itself. This method takes maximum advantage of traffic capacity of routes but provides little dispersion. Close column is normally used for marches during darkness, under blackout conditions, and rapid movement through urban areas to insure integrity and control of the column.

In open columns, the distance between vehicles is increased to provide greater dispersion. Vehicle distance varies from 50 to 100 meters. The increased distance provides greater protection against air and artillery fires and ground attack by small enemy forces. It also allows the command vehicle and other vehicles nor restricted by march orders to pass the column without disrupting its organization.

During a move by infiltration, vehicles are dispatched individually, as small groups, or at irregular intervals at a rate that will keep traffic density down and prevent undue massing of vehicles. Infiltration provides the best possible defense against enemy observation and attack. It is suited for tactical road marches when enough time and road space are available and when maximum security, deception, and dispersion are desired.

When vehicles are farther apart than prescribed in open/closed column, they close up by traveling at a prescribed higher speed. This catch-up speed is normally fast enough to allow the column to close up over a long road distance, thus reducing the accordion effect produced by rapid changes in sped. A fixed catch-up speed also provides an additional safety factor for the march.

CONDUCT OF THE TACTICAL ROAD MARCH

The movement order issued by the company commander includes information on the enemy and friendly situations, destination, route, rate-of-march, catch-up speed, order of march, start point, location and time, vehicle distances, release point, critical points, combat service support, communications, and location of the commander during the march. Many items of a movement order are SOP. Along with the order; the commander normally issues strip maps of the route. A strip map is a sketch of the route of march and contains as a minimum a start point, a release point, and critical points and distances between them. Strip maps should be issued to each squad leader or vehicle commander.

Before starting, each march unit has a designated team reconnoiter its route to the start point and determine the amount of time needed to reach it. The company also forms a quartering party element. It links up with the battalion quartering party before moving to the new assembly area. The company quartering party is normally headed by the executive officer or first sergeant and consists of representatives from platoons, company headquarters, and attached elements as necessary. The platoon sergeant and other designated persons may be assigned this duty. The battalion and company quartering parties move to the new assembly area before the main body moves. The quartering parties normally move by infiltration. Quartering party activities are a matter of SOP but should include--

- Securing the new assembly area.
- Searching for indications of enemy activity.
- Looking for mines and booby traps.
- Selecting routes to platoon location.
- Selecting initial vehicle positions.
- Selecting initial machine gun and anti-tank (AT) weapons positions.
- Meeting platoons at the release point and guiding vehicles into position.

Although some movement and lining up may be required before starting the move to the start point, ideally vehicles move from their positions directly into their proper place in the march unit. The march unit should proceed to the start point without stopping, arrive there on time, and pass through the start point at the proper speed and interval between vehicles.

During the move, the crew of each smoke vehicle maintains 360-degree observation around the vehicle. For M1059's the driver observes forward, the vehicle commander scans from right to left of the caliber .50 machine gun, and the smoke generator operator scans to rear, right to left. In motorized smoke vehicles, the driver observes forward and the vehicle commander scans to right, left, and rear.

Within the platoon column, each vehicle is assigned a sector of fire for the move. For M1059 units, each vehicle orients its caliber .50 machine gun so that they can rapidly fire on targets within their sector. The assignment of sectors of fire, coupled with the capability of firing the from the cargo hatch, provides the platoon with 360-degree security while on the move.

During the move, the platoon must be prepared to take action if attacked by enemy air, artillery, or ground forces. Passive measures against enemy air include--

- Maintaining proper interval between vehicles.
- Staggering vehicle positions within the column to avoid linear patterns.
- Camouflaging vehicles.
- Maintaining air observation.

If attacked by enemy air, vehicles in the colmn move from the axis of attack, either occupying covered and concealed positions or continuing to move, maintaining an evasive course. The unit also engages the aircraft with all available weapons.

If the column receives indirect fire during the move, button-up the vehicle, mask, and move rapidly out of the impact area. Masking is necessary because the enemy can use a mix of high explosive (HE) and chemical ammunition to disrupt movement and achieve maximum casualties. After the unit is through the impact area, the march unit commander will start unmasking procedures.

If engaged by enemy ground forces while on a tactical road march, vehicles attempt to continue movement, or the platoon leader may elect to assault the enemy or fix the enemy for other forces to attack.

Because the primary mission of the unit is to move to a new location in preparation for future operations, additional actions against ground forces depend on the size of the enemy force and instructions from the company team/march unit commanders. If the enemy force consists of snipers or other disruptive forces equipped with small arms, the commander may pass through the force or dispatch a platoon to eliminate it. If the force is larger and presents a danger to the task force as a whole, fragmentary orders may be issued for march units to leave the route of march, move to covered and concealed positions, and conduct a hasty attack as if conducting a movement to contact.

A march unit can conduct three kinds of halts: scheduled, unscheduled, and vehicle breakdown.

Scheduled halts are planned for maintenance and rest, or to comply with higher level time schedules. At scheduled halts, vehicles pull to the side of the road but still maintain march distance between vehicles. Crews dismount and establish local security.

Unscheduled halts are caused by unforeseen developments such as obstacles, ambushes, or other enemy activity forward of the platoon which prohibits further movement. If off-road movement is possible, the company team forms a coil for hasty perimeter defense. Platoons occupy a sector of the coil using the clock system. If off-road movement is not possible, the company team forms a herringbone. Crews dismount in heavily wooded areas to improve local security.

When a vehicle becomes disabled and cannot continue the move, the vehicle commander directs the driver off the road, so as not to impede traffic. If the vehicle blocks the road, it is towed or pushed away to clear the road. Once the vehicle is clear of the road, the carrier team attempts to repair the vehicle while the dismount team establishes security, provides guides, and directs traffic. The platoon to which the disabled vehicle belongs normally continues to move. If the crew repairs the vehicle and if the march unit has not passed completely, the crew and vehicle rejoin the march unit at the tail end. If the march column has passed, or the crew could not repair the vehicle, the vehicle waits for the serial's trail party. The trail party repairs the vehicle or it tows the vehicle to the supported units assembly area or trains location.

On arrival at the RP, the leader of the quartering party moves from a concealed position and guides the march unit to the company RP. Platoon guides direct the platoon's vehicles to their general locations, where the squad leaders assume control and select vehicle positions. Vehicles should not stop on roads or in open fields, but should move directly into concealed positions. Normally, the first element in the column is guided to positions farthest away from the entrance into the assembly areas. Succeeding element should move as far as possible into the assembly area, with the last platoon closing and securing the entrance.

If the platoon must move into an unprepared assembly area, the clock system can be used to rapidly establish a perimeter defense and road security. Normally, direction of movement is 12 o'clock.

When movement into an assembly area is conducted at night, platoon guides must use easily recognizable visual signals to insure that the vehicles follow the proper guides. Use of different colored flashlight lenses is one method of identifying platoon guides.

ASSEMBLY AREAS

As assembly area (AA) is occupied by a unit to prepare for future operations. The smoke platoon normally occupies a portion of the company or supported unit's AA. The AA is on defensible ground. It should provide concealment, room for dispersion, and good internal routes, as well as provide access to routes forward. Even though an AA is not expected to be a battle position, an all-round defense is organized with men and equipment positioned or dug in to provide security from ground and air attack. The amount of preparation at an AA depends on the unit's intended stay. Leaders insure that personnel continue to improve positions until the unit moves.

Priority of work at an AA is normally a matter of SOP, but it may be part of the movement or operation order. Although commanders may have differing priorities, the following are normally included, in the order listed--

- Establish local security by dispatching OPs, which should have wire communications with the platoon and be equipped with the M8A1 chemical-agent alarm. At platoon positions, local security is further achieved by alternating troops from work to watching, thus keeping roughly half the force providing security.

- Position vehicles and crew-served weapons where they can best be employed.

- Establish communications within the platoon and to the company CP. The platoon sets up a hot loop, connecting the squads to the platoon leader's vehicle by telephone. To speed the establishment of telephone communications, the platoon leader can take a member of the platoon headquarters element with him to the company CP. As he returns to the platoon AA, a land telephone line can be reeled out from the company CP back to his vehicle. Also, the platoon leader has a person who knows where the company CP is should a messenger be needed. In the AA, radio use at platoon and squad level should be restricted to radio listening silence.

- Position remaining squad members. As in the defense, the remaining squad members are positioned to provide security for crew-served weapons, to cover dead space, and to cover avenues of approach. Dismounted troops should prepare hasty fighting positions initially. You should--

  - Have clear fields of fire.
  - Tie in fires between squads and platoons so that uncovered gaps do not exist in the defense.
  - Prepare range cards for vehicle-mounted weapons and dismounted crew-served weapons.
  - Prepare a platoon sector sketch and forward a copy to the company CP.
  - Camouflage positions by using the appropriate camouflage screens for vehicles and natural material for fighting positions.

- Once the basics are accomplished, alternate squad rest periods while working to improve the defense. Improve the defense by digging fighting positions and providing overhead cover, setting out remote sensors, and establishing security patrols.

ACTIONS IN ASSEMBLY AREAS

Assembly areas provide the unit a secure defensible position where the unit can prepare for future operations. During and after the establishment of the defense, the following activities may take place:

- Leaders receive and issue orders.
- The unit maintains its equipment and weapons.
- Personnel conduct personal hygiene.
- Leaders inspect.
- The unit is resupplied to include distribution of ammunition and refueling of vehicles.
- The unit rehearses critical aspects of the upcoming operation.
- Weapon systems are checked and small arms are test fired, if possible.
- Troops eat and rest.
- The unit continues to improve its defenses.

APPENDIX C
CASUALTY EVACUATION

This appendix describes evacuation methods from M1059s. Because mechanized smoke units operate in the forward combat area, there is the possibility that crew members will become wounded. Crew members who are wounded or injured while in the M1059 will require evacuation.

To evacuate casualties quickly, every soldier in the platoon must know the evacuation procedures for different vehicle positions, such as vehicle upright, turned on either side, or overturned. For additional procedures on evacuating personnel from tracked vehicles, see FM 8-10-6.

NOTE
All members of the crew should be licensed to drive the M1059.

STEPS IN CASUALTY EVACUATION

OBSERVE FOR VEHICLE FIRE

When an M1059 is found that has been hit by enemy fire or damaged by a mine, it should be inspected to determine the extent of damage and to find out if there is a danger of fire. The externally fixed fire extinguisher handle should be pulled and a portable fire extinguisher readied, if the threat of fire exists. The handles for the fixed fire extinguisher on the inside are in the driver's compartment and on the top left side of the M1059. The fixed fire extinguisher is used to extinguish fires in the engine and crew compartments. The portable fire extinguisher is used to extinguish fires around the smoke generators. Open hatches and work exit points should be identified to plan swift evacuation of casualties.

STEPS IN CASUALTY EVACUATION C-1
SAFETY PRECAUTIONS C-2
EXITS C-2
PROCEDURES FOR CASUALTY EVACUATION C-3

MOVE VEHICLE TO SAFE LOCATION

If the vehicle can move under its own power, it should be moved to a safe location before evacuating casualties. If the driver is wounded and cannot operate the vehicle, he should be removed through the crew compartment, replaced, and the vehicle driven to a safe location.

CHECK AND TREAT CASUALTY

Too rapid an evacuation of a casualty may cause further injury. Before a casualty is evacuated, he should be checked thoroughly to discover the full extent of his injuries, and first aid should be administered to those wounds requiring immediate attention. There may be circumstances when this is not possible and the casualty must be evacuated immediately--for example, if the vehicle is burning or when conditions inside the M1059 do not allow for effective evaluation of injuries.

EVACUATE CASUALTY

After giving the necessary first aid, the casualty's CVC helmet should be disconnected or helmet removed and his seat belt released. If the vehicle is on its side or overturned, he must be supported before the seat belt is released, to prevent additional injuries. He is then evacuated. The combat vehicle crew uniform (CVCU) has a strap on inside, close to the collar for lifting personnel.

SAFETY PRECAUTIONS

Before evacuation, the load-carrying equipment (LCE) should be removed from the casualties in the crew compartment so that the equipment does not catch on anything during evacuation.

EXITS

To evacuate a casualty, crew members must know what exits are available. The M1059 has five exits: Track commander's (TC) hatch, driver's hatch, cargo hatch, ramp door, and ramp. Some may be used to evacuate any of the crew, and others are used for specific crew members.

When possible, the TC's hatch will be used to evacuate the vehicle commander and the smoke generator operator. The driver's hatch will be used to evacuate the driver. If one or both exits are blocked, or if the tactical situation stops their use, casualties will be evacuated through the troop compartment and out the ramp or ramp door. Casualties will be evacuated out the cargo hatch as a last resort.

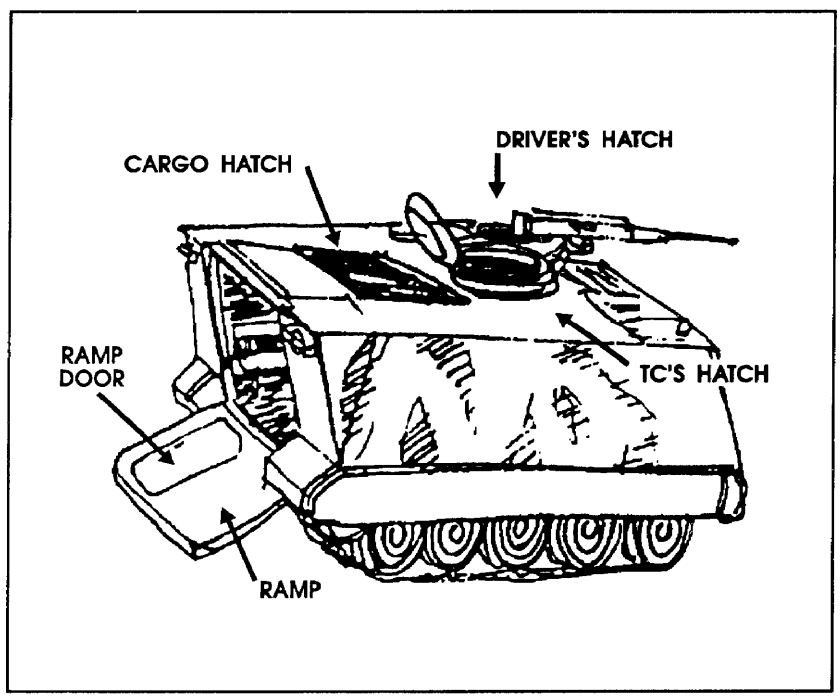


Figure C-1. M1059 exit points.

PROCEDURES FOR CASUALTY EVACUATION

The following procedures must be rehearsed so that the crew can effectively evacuate casualties:

DRIVER

When the driver's hatch is open and the situation allows, the driver is evacuated through the driver's hatch. The soldiers doing the evacuation will evacuate the driver after opening the hatch fully. One man will then lean head first into the hatch (assisted if necessary) to make sure the engine is off. If possible, he will raise the seat to the full up position, unbuckle the driver's seat belt, and disconnect his CVC helmet. Depending on the driver's injuries, he will be lifted out, from the top, by two soldiers, helped by another from the inside of the vehicle. A pistol belt, placed around the driver's chest and under his arms, can be used to pull him out. Once he is on the top of the vehicle, he will be passed down to personnel on the ground.

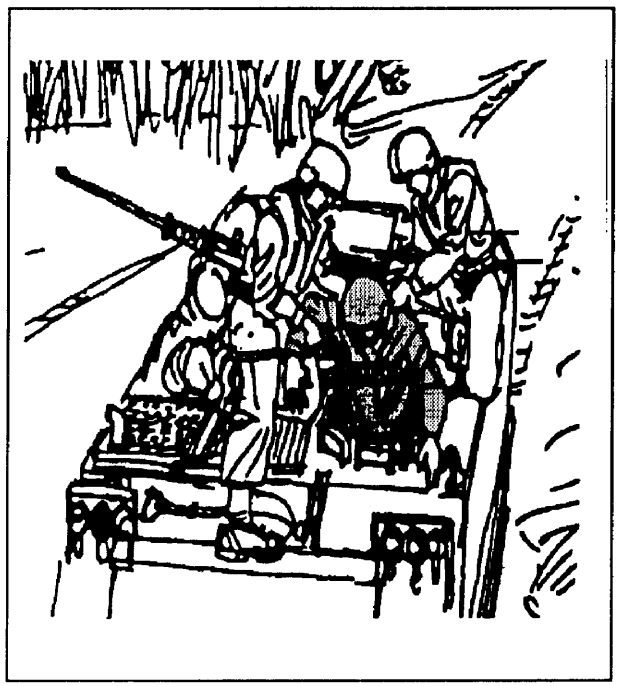


Figure C-2. Evacuating the driver.

The driver may have to be evacuated through the crew compartment and out the ramp, because his hatch is inoperable, the vehicle is receiving enemy fire, or some other tactical situation. The man closest to the driver checks to make sure the engine is shut off. The driver's seat is lowered and pulled to the rear. The driver's seat belt is unbuckled and his CVC helmet disconnected. The driver is grasped under the arms or in another way, depending on his injuries. He is then pulled into the crew compartment. Care must be taken not to further injure the driver because of close quarters or protruding objects. He will be evacuated out the ramp.

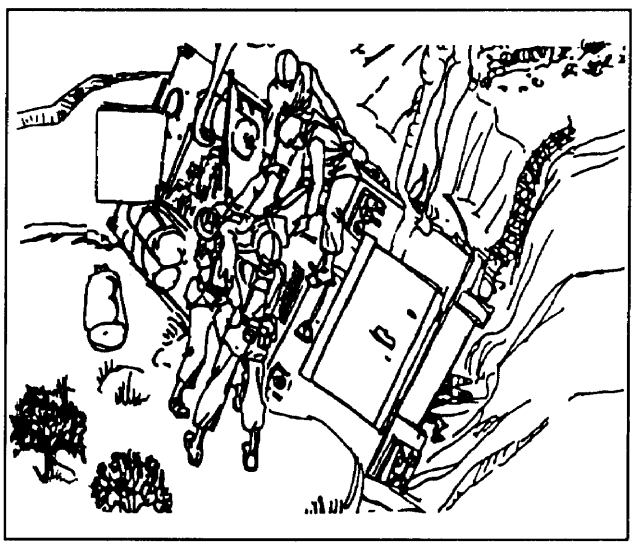


Figure C-3. Driver evacuation right side.

If the vehicle is on its side, the driver must be supported while his seat belt is unbuckled, to prevent other injury. If the vehicle is on its left side, it takes two soldiers to pull out the injured driver because the hatch opening will next the ground. If the vehicle is on its right side, four soldiers will be needed to pull out the driver and pass him down from the vehicle.

VEHICLE COMMANDER

If the vehicle commander is injured while occupying his position, he is pulled into the crew compartment. His CVC helmet is disconnected and he is evacuated out the ramp or ramp door.

SMOKE GENERATOR OPERATOR

If the smoke generator operator is injured while occupying his position, he is pulled into the crew compartment. His CVC helmet is disconnected and his seat belt unbuckled. He is evacuated out the ramp or ramp door.

The first steps in evacuating casualties are checking for injury and administering first aid before evacuating the casualties from the vehicle. Casualties should be moved quickly, but safely, to the proper medical facility for further treatment. Prompt, sure action on the part of fellow soldiers to evacuate casualties helps increase their chances of survival.

The platoon must understand the supported unit's casualty evacuation plan. Many units have signals stated in their SOPs indicating casualties on board a vehicle, such as flying a VS-17 panel from the antenna. This allows medical evacuation vehicles to move rapidly to those vehicles with casualties.

APPENDIX D
COMBAT LOAD PLANS

Combat loading consists of the standard loading and stowage of ammunition and equipment in the vehicles. This helps to insure that all equipment is present and that it is stowed in the proper location, and that it is readily accessible.

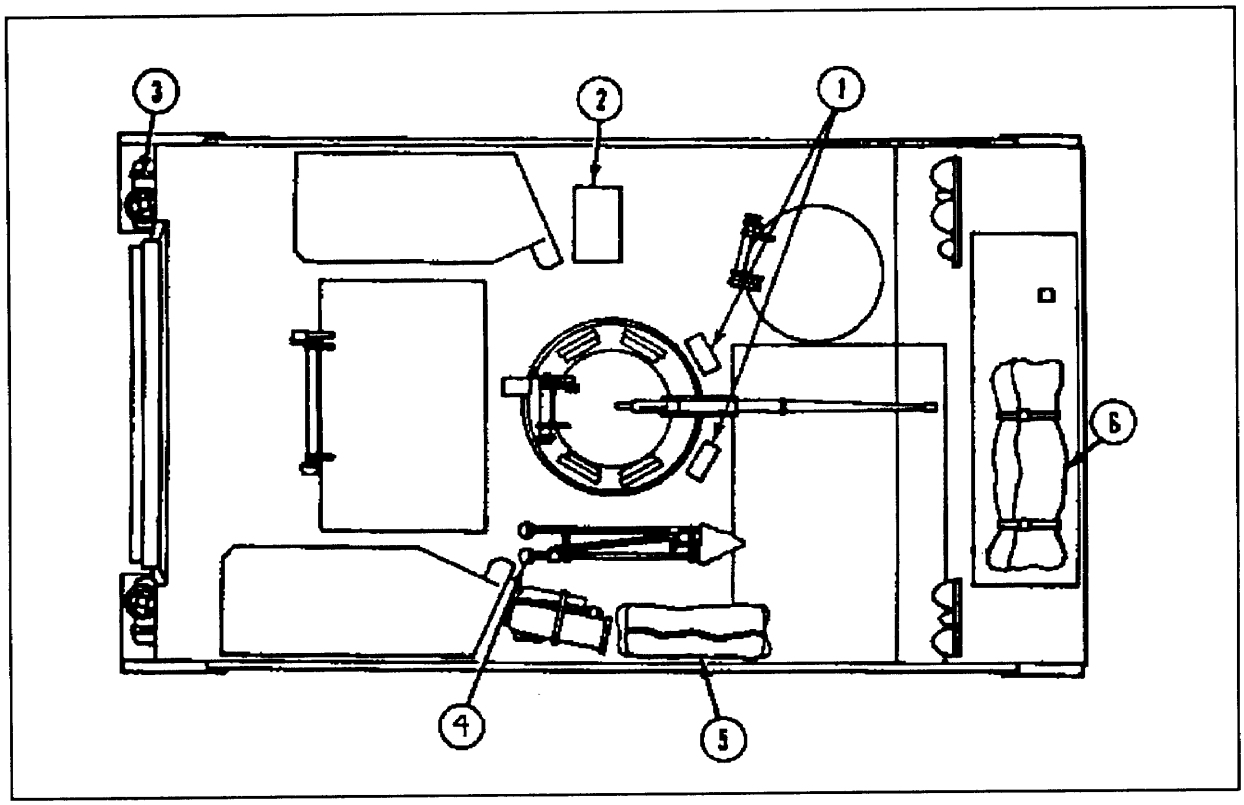
WARNING

All equipment must be tied down or secured to prevent injuries if the vehicle rolls over.

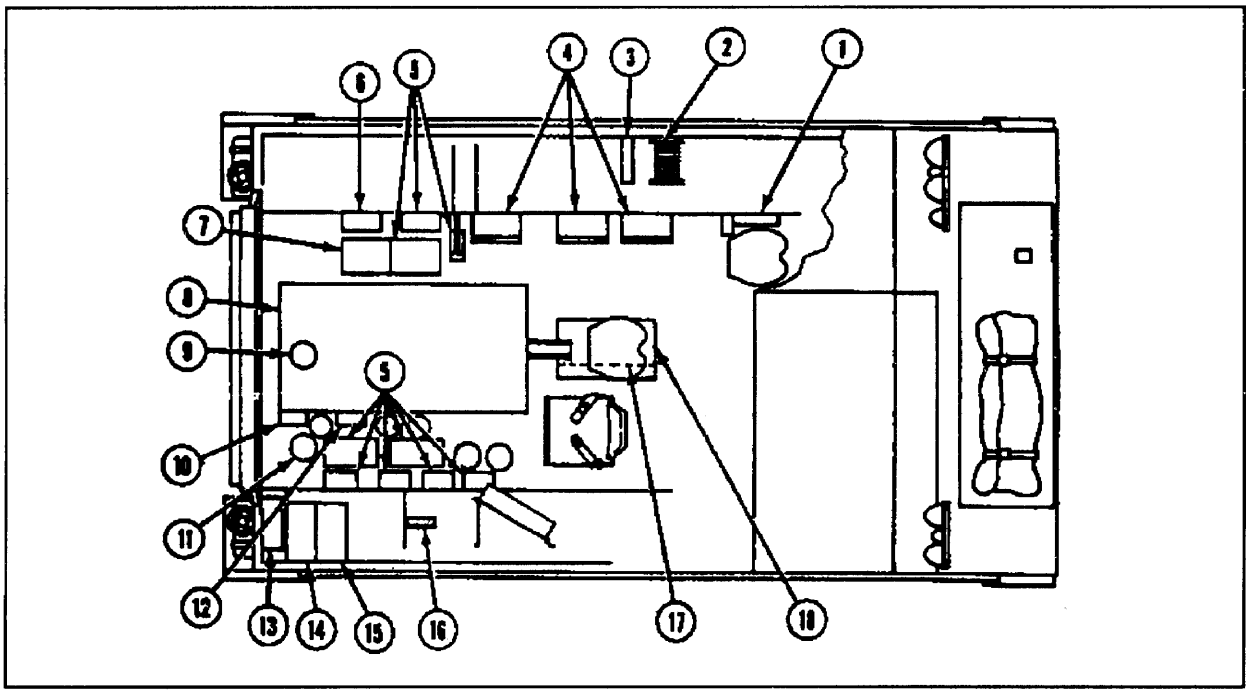
Because the equipment carried on a vehicle will vary slightly depending on whether it is used by a squad or platoon leader or platoon sergeant, a standard combat-load plan should be developed for each vehicle. The authorized unit equipment may vary based on unit mission, geographical location, and basic loads of ammunition.

This appendix -- which should be used with the operator's manual -- discusses a standard procedure for loading of a M1059. Based on mission-essential equipment and ammunition, the combat-load plans should be modified to fit the needs of each unit.

M1059



1	Ammo cans, cal .50 (2 ea)
2	MRE-ration cases (2 ea)
3	Smoke generator fuel (MOGAS)
4	Tripod, cal .50 MG
5	Camouflage support system
6	Camouflage screen



1	Map canister	10	M13 Decon apparatus portable
2	WD-1/TT, DR-8, 1320 ft	11	Duffle bags (6 ea)
3	Binoculars	12	Water can
4	Ammo cans, cal .50 and 5.56 (3 ea)	13	Telephone set, TA-1 or TA-312
5	Ammo cans, cal .50 and 5.56 (3 ea)	14	Night vision sight, AN/TVS-5
6	Ammo cans, 5.56 (1 ea)	15	Night vision sight, AN/PVS-4
7	Ammo cans, 5.56 (1 ea)	16	Ammo can w/ cal .50 cleaning rod & case; T&E mech, cal .50
8	Fog oil tank (120 gal)	17	Night vision goggles (PVS-6)
9	Fill port	18	MRE-ration cases (4 ea) under TC seat

APPENDIX E
SAMPLE TACTICAL STANDING OPERATING PROCEDURES

The intent of this appendix is to provide an outline as an aid for developing tactical standing operating procedures (TSOP). Establishing a TSOP requires exhaustive research to properly put it together. The key is not to repeat doctrine, but to supplement it with how your unit fights.

In preparing your TSOP, keep in mind that there may be conflicts between your instructions and those of the supported unit. While you train your unit to standard based upon your TSOP, the supported unit TSOP in most cases should supersede yours (that is, your goal should be to help prevent fratricidal engagements).

I. GENERAL

A. Purpose: This TSOP prescribes standard procedures for use during all combat situations and provides a comprehensive reference for conducting operations in a field environment.

B. Conformity: All assigned, attached and operational control (OPCON) personnel will read and comply with the provisions of this TSOP.

II. BATTLE COMMAND

A. Command

1. Organization:

a. Succession of command

b. Cues for assuming command

2. Troop leading procedures

a. Estimate input (checklist)

b. Precombat inspection (checklist)

c. Backbriefs

d. Rehearsals

e. Combat orders

(1) Formats

(2) Preparation

(3) Reproduction

(4) Dissemination

3. Coordination with adjacent units (checklist)

4. Liaison with main body elements (checklist)

B. Control

1. Combat graphics and symbols

2. Control measures designation (numbering system)

3. Terrain identification reference system

4. Operational terms

5. Vehicle identification marking system

6. Unit recognition signals

7. Communication

a. Net diagrams

b. Fixed call signs

c. Brevity codes/cue words

d. Anti-jamming actions

e. Alternate means

8. Reports

a. Battle

b. Intelligence

c. Logistical

III. MANEUVER

A. Readiness condition (REDCON)

B. Quartering party

C. Road marches

D. Assembly areas

1. Load plans

2. March formations

E. Organization for combat

F. Formations

G. Battle Drills

1. Actions on contact

2. Fix and bypass

3. Bridges/defile

4. Formation changes

5. Passage of lines

6. Consolidate on the objective

7. Ambush

8. Other drills

H. Reconnaissance operations

1. Area reconnaissance

a. Graphics

b. Critical tasks

2. Route reconnaissance

a. Graphics

b. Critical tasks

I. Security operations

1. Cover

a. Graphics

b. Critical tasks

2. Screen

a. Graphics

b. Critical tasks

J. Limited visibility operations (checklist)

K. Break in action (checklist)

1. Redistribution of ammunition, personnel, and equipment

2. Evacuation of casualties and enemy prisoners of war (EPW)

3. Redistribution of ammunition under fire

L. Relief in place

1. Relief in place graphics

2. Critical tasks

IV. MOBILITY AND SURVIVABILITY

A. Mobility

1. Standard tasks

2. Standard priorities

B. Survivability

1. Standard tasks

2. Standard priorities

3. Fighting position construction

C. NBC defense

1. NBC defense organization

2. Unit NBC equipment

3. Defense against nuclear attack

4. Defense against chemical/biological attack

5. Decontamination

6. NBC reconnaissance

V. FIRE SUPPORT

A. Fire support (FS) request sequence

B. FS planning and execution matrix format

C. Graphics

VI. AIR DEFENSE

A. Air defense (AD) warning and cue words

B. Weapons control status and cue words

VII. INTELLIGENCE/ELECTRONIC WARFARE

A. Intelligence

1. Standard tasks

2. Standard priorities

B. Electronic Warfare (EW)

1. Standard tasks

2. Standard priorities

3. Countermeasures

VIII. LOGISTICS

A. Resupply procedures

1. LOGPAC procedures

2. Battle loss actions

B. Health service support (HSS)

1. Identification, treatment and evacuation of casualties

2. Field sanitation

C. Maintenance support

1. Battle damage assessment and repair

2. Exchange criteria

3. Cannibalization criteria

4. Destruction criteria

5. Maintenance repair time guidelines

D. Personnel

1. Replacements

2. Accountability

3. Personnel actions

E. Enemy prisoner of war handling

1. Handling

2. Documents

IX. SAFETY

X. REFERENCES

APPENDIX F
S A F E T Y

All training has inherent risks. The risk management is a tool that helps leaders make sound logical decisions. Risk management enables leaders at all levels to manage risk. Safety risk management is a specific type of risk management.

RISK MANAGEMENT

Risk management is the process of five steps: identify hazards, assess hazards, make risk decisions, implement controls and supervise.

Identify hazards. Identify the most probable hazards for the mission. Hazards are conditions with the potential of causing injury to personnel, damage to equipment, loss of material, or lessening of ability to perform a task or mission. The most probable hazards are those created by readiness shortcomings in the operational environment. When a list of frequently recurring hazards is applied to a specific task or mission, the most probable hazards can be identified.

Rules of Risk Management

- Integrate risk management into planning.
- Accept no unnecessary risk.
- Make risk decisions at the proper level.
- Accept risk if benefits outweigh the cost.

Assess Hazards. Once the most probable hazards are identified, analyze each to determine the probability of its causing an accident and the probable effect of the accident. Also identify control options to eliminate or reduce the hazard. A tool to use is the Army Standard Risk Assessment Matrix (Figure F-1).

Make Risk Decisions. Weigh the risk against the benefits of performing the operation. Accept no unnecessary risks, and make any residual risk decisions at the proper level of command.

RISK MANAGEMENT F-0
SAFETY CHECKLIST F-1
SAFETY GUIDANCE F-6
VEHICLE-MOUNTED EQUIPMENT SAFETY F-6
TANK AND PUMP UNIT F-7
LOADING AND UNLOADING FOG OIL AND GASOLINE F-8
GENERAL FUEL SAFETY F-8
GENERAL SMOKE SAFETY F-9

Implement Controls. Integrate specific controls into plans, orders, SOPs, and rehearsals. Communicate controls down to the individual soldier.

Supervise. Determine the effectiveness of controls in reducing the probability and effect of identified hazards. Ensure that risk control measures are performing as expected. Include follow-up during and after action to ensure all went according to plan, reevaluating or adjusting the plan as required, and developing lessons learned.

THREE-TIER APPROACH

The Army has established a three-tier approach to risk management. The foundation tier is command level. This level is responsible for a plan for safety, setting standards, training consistent with abilities of those being trained, providing resources, and making risk acceptance decisions.

The leader level is next, and this is where each of you come into play. The leader places emphasis on adherence to standards, assesses and balances risks, and is the implementor of the safety controls to eliminate or control risks.

The individual soldier must understand your safety responsibilities, recognize unsafe conditions and acts, and perform to standards. But because of your unique position as a leader and soldier, you must teach individual soldiers their responsibilities.

LEVELS OF RISK

There are four levels of risk - the first being “low” risk operations where normal caution, supervision, and safety procedures should ensure a successful and safe mission.

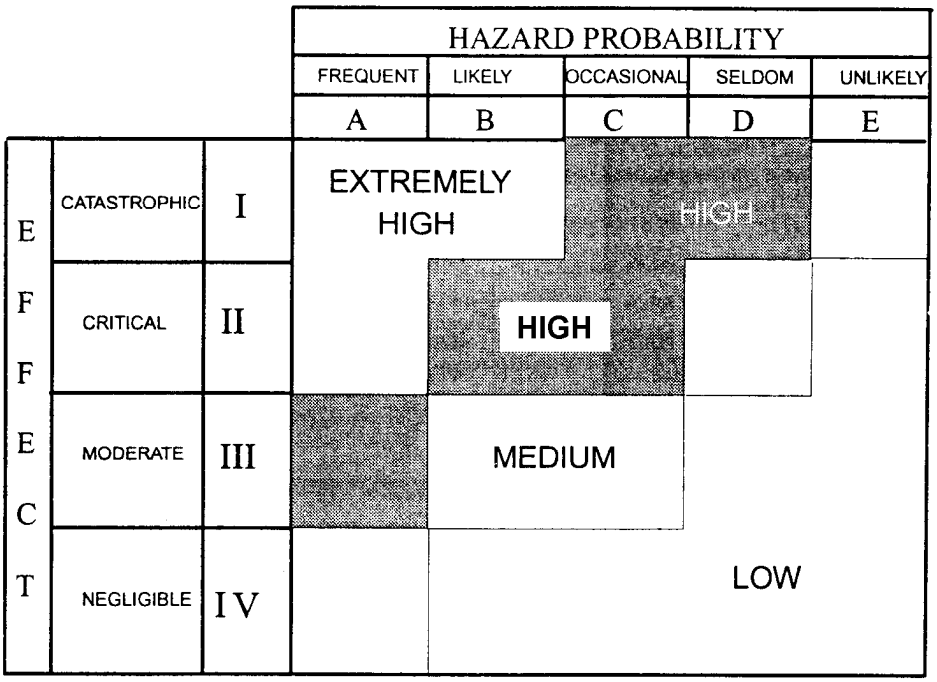
The second risk level is “medium.” There is probable occurrence of minor, non-life threatening personnel injuries and equipment damage. These operations have a remote possibility that severe injury or death will occur. These operations need complete unit involvement.

In “high” risk mission capabilities are significantly degraded and there is a probability that severe personnel injuries, death, and major equipment damage will occur.

The last level of risk is “extremely high.” In this level the unit will be unable to accomplish its mission and there is the probability that mass casualties or death will occur, plus complete destruction of equipment.

SAFETY CHECKLIST

- ALWAYS keep down your speed. Pay attention to the maximum speed of the vehicle. ALL VEHICLES CAN BE ROLLED.
- ALWAYS follow all the safety information contained in the operator’s manual. The information was put there to protect you and the equipment. DON’T TAKE SHORTCUTS.
- ALWAYS ensure all equipment is secured and not loose. You don’t want any equipment flying around when moving; **someone may get hurt.**
- ALWAYS keep communications gear off the floor. You don't want to damage the equipment. It may not work when you need it most.
- ALWAYS conduct PMCS on your equipment, and be thorough. You don’t want it to quit when you need it most.
- ALWAYS ensure everyone uses seat belts. Not using them may cause injury to the crew. REMEMBER: Soldiers in the back can’t see outside and don’t know what may be coming at them.
- ALWAYS be prepared for a fire. Have extinguisher ready and functional.



SOME FACTORS TO CONSIDER IN RISK MANAGEMENT

Level of acitivity	Hazardous materials used
Inherent dangers of equipment used	Environmental concerns
Operational conditions	Complexity of movement
Personnel/organization proficiency	Supervision
Weather	Complexity of mission
Condition of personnel	Level of planning
Availability of protective equipment	Adequacy of site
Accident frequency	Adequacy of directions given

EFFECT

1. **CATASTROPHIC** Death or permanent total disability, system loss, major property damage.

2. **CRITICAL** Permanent partial disability, temporary total disability in excess of 3 months, major system damage, significant property damage.

3. **MARGINAL** Minor injury, lost workday accident, compensable injury/illness, minor system damage, minor property damage.

4. **NEGLIGIBLE** First aid or minor supportive medical treatment, minor system impairment.

PROBABILITY

A. **FREQUENT**

Indiv Soldiers/Item Occurs often in career/equipment service life.
All Soldiers Exposed or Continuously experienced.

B. **LIKELY**

Indiv Soldiers/Item Occurs several times in career/equip service life.
All Soldiers Exposed or Occurs frequently.

C. **OCCASIONAL**

Indiv Soldiers/Item Occurs sometime in career/equip service life.
All Soldiers Exposed or Occurs sporadically or several times in inventory service life.

D. **REMOTE**

Indiv Soldiers/Item Possible to occur in career/equip service life.
All Soldiers Exposed or Remote chance of occurrence; expected to occur sometime in inventory service life.

E. **UNLIKELY**

Indiv Soldiers/Item Can assume will not occur in career/equipment service life.
All Soldiers Exposed or Possible, but improbable; occurs very rarely.

NOTE: Unit experience and exposure affect probability of occurrence.

RISK LEVELS

EXTREMELYHIGH RISK: Loss of ability to accomplish mission.

HIGH RISK: Significantly degrades mission capabilities in terms of required mission standards.

MEDIUM RISK: Degrades mission capabilities in terms of required mission standards.

LOW RISK: Little or no impact on accomplishment of mission.

RESIDUAL RISK: Risk remaining after risk reduction efforts.

Figure F-1. Army standard risk assessment matrix.

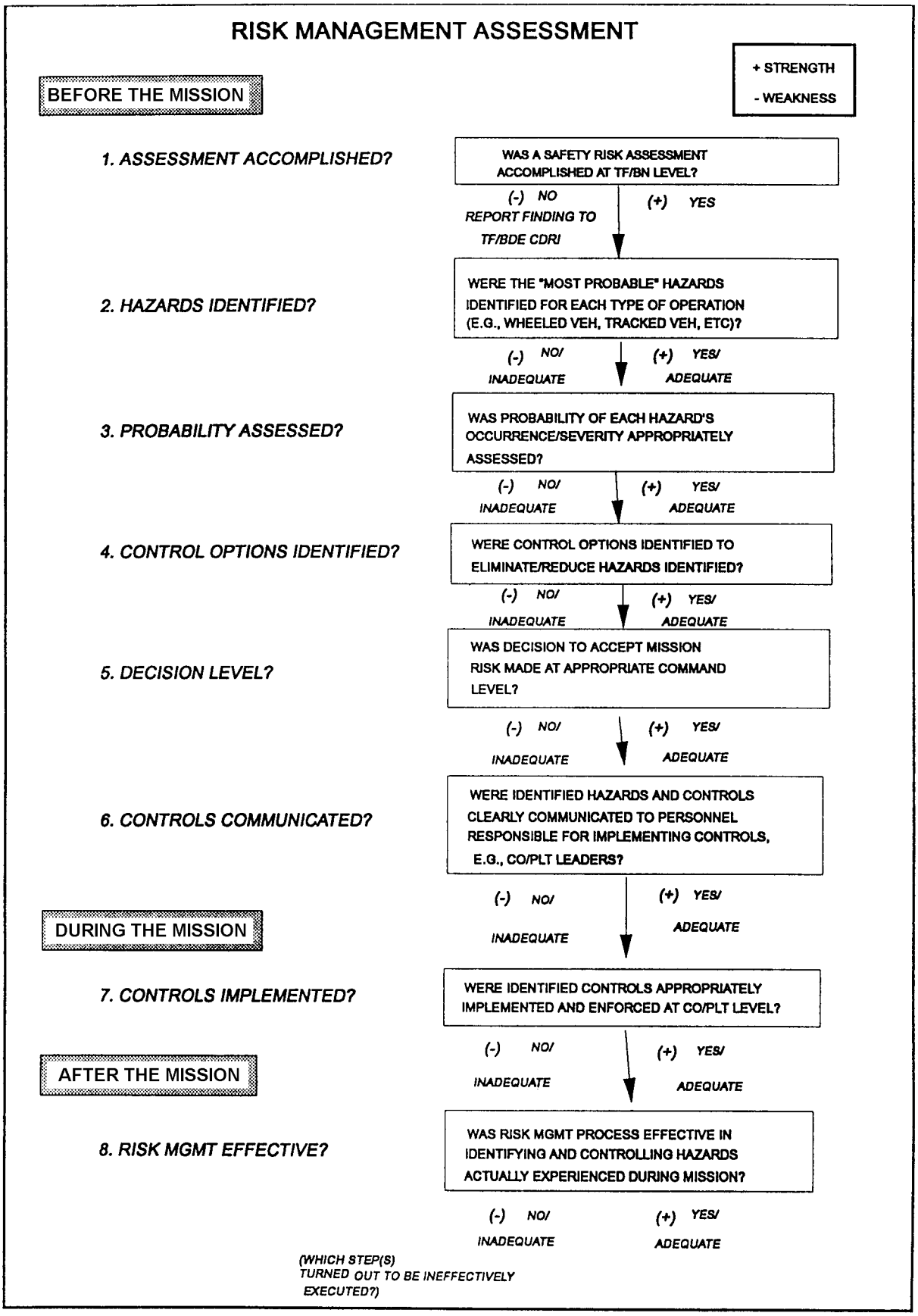

RISK MANAGEMENT ASSESSMENT
+ STRENGTH
- WEAKNESS
BEFORE THE MISSION
1. ASSESSMENT ACCOMPLISHED?
WAS A SAFETY RISK ASSESSMENT ACCOMPLISHED AT TF/BN LEVEL?
(-) NO
REPORT FINDING TO TF/BDE CDR!
(+) YES
2. HAZARDS IDENTIFIED?
WERE THE "MOST PROBABLE" HAZARDS IDENTIFIED FOR EACH TYPE OF OPERATION (E.G., WHEELED VEH, TRACKED VEH, ETC)?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
3. PROBABILITY ASSESSED?
WAS PROBABILITY OF EACH HAZARD'S OCCURRENCE/SEVERITY APPROPRIATELY ASSESSED?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
4. CONTROL OPTIONS IDENTIFIED?
WERE CONTROL OPTIONS IDENTIFIED TO ELIMINATE/REDUCE HAZARDS IDENTIFIED?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
5. DECISION LEVEL?
WAS DECISION TO ACCEPT MISSION RISK MADE AT APPROPRIATE COMMAND LEVEL?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
6. CONTROLS COMMUNICATED?
WERE IDENTIFIED HAZARDS AND CONTROLS CLEARLY COMMUNICATED TO PERSONNEL RESPONSIBLE FOR IMPLEMENTING CONTROLS, E.G., CO/PLT LEADERS?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
DURING THE MISSION
7. CONTROLS IMPLEMENTED?
WERE IDENTIFIED CONTROLS APPROPRIATELY IMPLEMENTED AND ENFORCED AT CO/PLT LEVEL?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
AFTER THE MISSION
8. RISK MGMT EFFECTIVE?
WAS RISK MGMT PROCESS EFFECTIVE IN IDENTIFYING AND CONTROLLING HAZARDS ACTUALLY EXPERIENCED DURING MISSION?
(-) NO/ INADEQUATE
(+) YES/ ADEQUATE
(WHICH STEP(S) TURNED OUT TO BE INEFFECTIVELY EXECUTED?)

Figure F-2. Risk management assessment.

RISK MANAGEMENT PROCESS

IDENTIFY HAZARDS - Identify hazards for this mission. HAZARD - a condition with the potential of causing injury to personnel, damage to equipment, loss of materiel, or lessening of ability to perform a task or mission.

ASSESS HAZARDS - Analyze each hazard to determine the probability of it causing an accident and the probable severity of the accident. Identify control options to eliminate or reduce hazards.

MAKE RISK DECISION - Weigh the risk against the benefits of performing the operation. Accept no unneccessary risks. Make decisions at proper level.

IMPLEMENT CONTROLS - Integrate specific controls (identified in 2nd step) into plans, OPORDs, and rehearsals.

SUPERVISE - Determine the effectiveness of controls in reducing the probability and the severity of hazards identified. Ensure that risk controls are performing as expected Includes following-up during & after an action to ensure all went according to plan, re-evaluating/adjusting plan as required and developing lessons learned.

READINESS SHORTCOMINGS

INDIVIDUAL (48%) - SOLDIER KNOWS AND IS TRAINED TO STANDARD BUT ELECTS NOT TO FOLLOW STANDARD (SELF DISCIPLINE).

- ATTITUDE
- OVERCONFIDENCE
- HASTE
- FATIGUE (SELF-INDUCED)
- ALCOHOL, DRUGS

LEADER (18%) - LEADER DOES NOT ENFORCE KNOWN STANDARD.

- DIRECT SUPERVISION
- UNIT COMMAND SUPERVISION
- HIGHER COMMAND SUPERVISION

TRAINING (18%) - SOLDIER NOT TRAINED TO KNOWN STANDARD (INSUFFICIENT, INCORRECT OR NO TRAINING ON TASK).

- SCHOOL
- UNIT
- EXPERIENCE, OJT

STANDARDS (8%) - STANDARDS/PROCEDURES NOT CLEAR OR PRACTICAL, OR DO NOT EXIST.

- TASK - CONDITION - STANDARD
- OPERATING PROCEDURES (AR, TM, FM, SOP, ETC.)

SUPPORT (8%) - EQUIPMENT/MATERIEL IMPROPERLY DESIGNED/NOT PROVIDED; INSUFFICIENT NUMBER/TYPE OF PERSONNEL; INADEQUATE MAINTENANCE/FACILITIES/SERVICES

SAFETY OBSERVATION INFORMATION ELEMENTS

1. UNIT 2. TYPE OF OPERATION 3. PROBLEM AREA 4. READINESS SHORTCOMING(S)

PROBLEM AREAS - Aviation Operations	COMMON READINESS SHORTCOMINGS				
	INDIVIDUAL	LDR	TNG	STDS	SUPPORT
Scan	X	X	X	X	
Coordinate	X	X	X	X	
Detect Hazards/Obstacles					
Maintain/Recover Orientation	X	X			
Plan - Preflight	X				
Plan - During Flight	X	X			
Diagnose/Respond to Emergency					
Estimate Distance/Closure					
Other (Specify)					

Figure F-3. Risk management reference card.

SAFETY OBSERVATION INFORMATION ELEMENTS

1. UNIT 2. TYPE OF OPERATION 3. PROBLEM AREA 4. READINESS SHORTCOMING(S)

PROBLEM AREAS - Ground Operations	COMMON READINESS SHORTCOMINGS				
	INDIVIDUAL	LDR	TNG	STDS	SUPPORT
WHEELED VEHICLE					
Excessive Speed	x	x	x		
Unsafe Road Conditions	x		x	x	
Night/Excessive Duty Hours		x		x	
Improper Turning	x		x		
Unsafe Mechanical Condition			x		x
Improper Passing			x		
Following too Close	x	x	x		
Other (Specify)					
TRACKED VEHICLE					
B-D-A Operations Checks	x	x			x
Rough Terrain	x		x		
Excessive Speed	x	x	x	x	
Darkness/Fatigue	x	x	x	x	
Improper Ground Guiding	x	x			
Crew Coordination/Commo	x		x	x	x
Other (Specify)					
WEAPONS HANDLING					
Sighting/Aiming/Firing/Throwing	x	x	x		x
Unauthorized Use/Handling (Duds)	x	x	x		
Carrying/Lifting/Transporting	x				
Disarming/Unloading (improper clearing)	x		x		
Body Positioning	x				
Loading/Arming	x		x		
Emplacing	x				
Assembling/Cleaning/Disassembling *(improper clearing)*	x		x		
Other (Specify)					
MAINTENANCE					
Improper Use of Tools/Equipment	x	x	x	x	x
Improper Lifting	x			x	
Improper Body Position	x		x		
Improperly Secured Materiel/Equip/Veh	x	x			
Improper Push/Pull/Grip/Hold	x				
Inadequate Inspection (Components, Equip/Area)			x		
Other (Specify)					
MATERIEL HANDLING					
Improper Technique	x	x	x		
Unsecured/Unstable Load	x		x		
Environmental Hazard		x			x
Getting On/Off Vehicle	x				
Equipment Usage		x			
Other (Specify)					
COMBAT SOLDIERING					
Improper PLF					
Traversing Terrain Under Adverse Env Conditions					
Camouflaging (Removing/Emplacing Net)					
Camouflaging (Failed to Maintain 3 point contact)					
Patrolling/Reconnoitering/Scouting					
Infiltrating/Assaulting/Retreating					
Tactical Road March					
Other (Specify)					
OTHER (SPECIFY)					

Figure F-3 (Continued). Risk management reference card.

SAFETY GUIDANCE

Soldiers are our most important resource. Leaders at all levels must ensure that their soldiers perform their mission tasks in an environment that is as risk-free as possible. The following outlines safety guidance for smoke generators, smoke pots, and for handling fuel associated with smoke generators.

VEHICLE-MOUNTED EQUIPMENT SAFETY

There are four primary vehicle mounted systems found in smoke units: The M3A4 mechanical smoke generator mounted on either an M998 HMMWV or M151-series truck, the M157 mechanical smoke generator mounted on an M1037 HMMWV, the M1059 mechanized smoke generator carrier, and the TPU mounted on a 5-ton truck. For the sake of simplicity, most of the smoke specific safety issues are listed under the first section on the M3A4 Mechanical Smoke Generator. This guidance is to be considered in addition to the system specific guidance that follows.

M3A4 SMOKE GENERATORS AND M157 SMOKE SYSTEM

Wear a protective mask when operating in the smoke (see General Smoke Safety, page F-8).

Never move the vehicle without an assistant driver, or a track commander in the Ml13.

Purge the generator of air before removing a hot engine head.

No smoking around generator.

Wear hearing protection at all times while on the smoke line or within 25 feet of a running generator.

Never walk in front of a hot generator.

Three people are required to lift or carry a hot generator to prevent injury, should a generator "belch."

Unloading the generator requires two people. Grasp the handles extended from the end of the generator and lift it from the vehicle.

Since the smoke generator depends on the flow of fog oil for cooling, operating the generator for more than 2 minutes without fog oil will damage or make the generator inoperable.

A 5-pound CO_2 fire extinguisher should be kept within arm's reach of the generator when it is operating.

Always add fuel to the generator from the fuel tank side. Do not overfill the tank. Always stop within½ to 1 inch of the top of the fuel tank.

The gas can should be capped and placed a minimum of 15 feet to the rear of the generator when it is operating.

Engine head will become very hot immediately after shut down. Do not touch the engine head or engine with bare hand.

A ground guide should be used when driving in smoke.

Never remove a hot generator head without having a good head ready to put in as soon as the hot head is removed.

Have a container of water available to cool the hot head.

5-TON TRUCK WITH TPU MOUNTED

Truck should have an assistant driver.

Put vehicle on level ground, if possible.

Put vehicle in neutral.

Put hand brake on.

Chock wheels between rear duals (both sides of vehicle).

Ground vehicle. Check for static electricity before attaching ground wire to rod.

Take caution when walking on the truck bed.

Do not wear metal taps or metal cleats on boots.

In cold weather, gasoline will cause severe injury to exposed skin.

When operating the TPU, you must wear hearing protection.

Never operate the TPU without a fire extinguisher present and within easy reach.

2½-TON TRUCK, TRANSPORTING FOG OIL

Truck should have an assistant driver.

Do not walk on the ramp.

Do not straddle the ramp.

Do not try to stop a rolling drum.

Do not try to stop a falling fog oil drum.

Use three soldiers to load a fog oil drum.

Use caution walking on back of truck after transporting fog oil.

TANK AND PUMP UNIT

Exercise caution when walking on the truck bed, sides, and tailgate.

Do not smoke within 50 feet of the TPU.

Do not wear metal taps or metal cleats on boots or shoes around TPU.

In cold weather, gasoline will cause severe cold weather injury to exposed skin; handle with extreme care and use gloves, when possible.

Post “No Smoking” signs.

Drive grounding rod into ground near TPU. Attach grounding cable to grounding rod.

Attach nozzle ground to container which is being filled.

Place fire extinguisher 5 to 10 feet away from TPU.

LOADING AND UNLOADING FOG OIL AND GASOLINE

Never walk up and down ramp. Do not straddle the sides of ramp while rolling drum up ramp. Do not attempt to stop a rolling drum or a drum which may be falling off the ramp or truck.

Place feet flat on ground and use leg muscles when lifting a drum.

Wear gloves when handling drums to avoid cutting fingers and hands on burrs.

Check fog oil drums for leaks. Check for major defects such as dents of more than 3 inches deep on drum body or 1½ inches deep on cans. Check for damage to bungs or caps, heavy rust, and any leakage or missing gaskets on cans.

Ensure ramp is constructed properly. Any field expedient ramp must be constructed to support 700 pounds. The weight of a filled fog oil drum is approximately 470 pounds.

Clear rocks and other objects that may puncture drum from behind the truck and ensure no one is immediately behind the truck when dropping drums.

Roll a drum on its side to the foot of the ramp with the aid of at least one helper (you on one side, the helper on the other). Roll the drum up the ramp onto the truck.

When working on bed of truck, that contains fog oil, be careful when walking. Any spills of fog oil are very slippery.

When dismounting the truck do not step out on a drum of fog oil. You could easily slip and fall.

Whenever possible, use tie-down straps or rope to secure the load so it won't shift.

Never smoke when loading and unloading fog oil and gasoline or within 50 feet of the operation.

Whenever possible, transport fog oil and gasoline in separate trucks. It is safer and lessens a fire hazard.

The truck must be located a safe distance from personnel or equipment to prevent damage or injury when drums are roiled off ramp.

GENERAL FUEL SAFETY

Gasoline dries the skin. Keep hands out of gasoline. Keep away from mouth and eyes, open cuts, and abrasions.

Gasoline fumes are injurious as well as flammable. Avoid inhaling fumes as much as possible.

Carbon dioxide fire extinguishers should be provided and located where they will be easily accessible in case of fire. Sand or dirt, not water, should be thrown on burning fuel if extinguishers are not available. Include a fire blanket or wet blanket at the fueling site.

No smoking will be allowed within 50 feet of gasoline or flame fuel. Post "No Smoking" signs in prominent places around an area where fuel is being mixed, handled, or stored. If "No Smoking" signs are not available, post guards.

Open flames, heated stove, or other sources of heat that might cause combustion of gasoline fumes must not be permitted within 50 feet of an area where fuel is being handled or stored.

Pure oxygen must never be used as a source of pressure for mixing or transferring fuels. If oxygen is introduced, a violent explosion may result.

Fuel containing grit, dirt, sand, and the like should be used only in flame field expedients.

Self-closing metal receptacles with metal lids should be provided for discarding oily or gasoline-soaked rags. Dispose of these rags daily.

Gasoline is highly flammable. Special precautions should be taken to prevent metal containers from striking other metal surfaces capable of sparking. Any metal except the non-sparking type, such as brass, will spark when struck against another metal surface.

Mechanical equipment used to mix or transfer raw gasoline or fuel must be grounded prior to use, and must be kept grounded during use to safeguard against static electricity. (Details on grounding procedures can be found in special manuals for the equipment to be used).

GENERAL SMOKE SAFETY

Personnel will carry the protective mask when participating in exercises which include the use of smoke.

Personnel will don their protective mask--

- Before exposure to any concentration of smoke produced by ABCM8 HC (white) smoke grenades, HC smoke pots, phosphorous smokes, or metallic powder obscurants.

- When passing through or operating in dense visibility (less than 50 m) oil smokes (for example, blanket).

- When operating in or passing through light visibility (more than 50 m) oil smokes (for example, haze) and the duration of exposure exceeds four hours.

- Anytime exposure to smoke produces breathing difficulty, eye irritation, or discomfort. Such effects in one individual will serve as a signal for all similarly exposed personnel to mask.

Personnel will mask when using smoke during MOUT training and when operating in enclosed spaces.

Showering and laundering of clothing following exercises will eliminate the risk of skin irritation following exposure to smoke. Troops exposed to smoke should reduce skin irritation by rolling down their sleeves.

TOXICITY OF HC SMOKE

Special care must be taken when using HC smoke to ensure that appropriate protection is provided to all personnel who are likely to be exposed. When planning for the use of HC smoke in training, specific consideration must be given to weather conditions and the potential downwind effects of the smoke. Establish positive controls to prevent exposure to unwarned, unprotected troops (for example, smoke control points, communications).

Wear a protective mask when exposed to HC smoke at all times. HC is toxic in high concentrations. Fatalities have occurred from HC smoke exposure during routine training where soldiers were not informed of the hazards.

SMOKE POT SAFETY

Do not use the pull ring or safety pin on the fuze for lifting or handling smoke pots.

Vent M4A2 HC floating smoke pots for at least 5 minutes within 24 hours before firing by removing adhesive tape from vent-holes in the inside cover. Re-cover the holes with adhesive tape before firing smoke pots.

Before igniting the ABCM5 smoke pot electrically, remove the tape from the center of the tear trip to vent the Smoke Pot.

When chain igniting the ABCM5 smoke pot, remove the tear strip from all pots.

When igniting the ABCM5 smoke pot electrically, a minimum safe distance of 50 feet is required.

Use a 4- to 6-foot pole when moving a misfired pot immediately following the first ignition attempt. After 5 minutes, the misfired pot can be moved safely by hand.

When authorized to burn smoke pots to prevent enemy use, be sure that smoke from the pots does not interfere with the operations of nearby tactical units.

When igniting a smoke pot manually, keep the head well to one side of the top of the pot and out of the way of sparks or flame.

APPENDIX G
WEATHER AND TERRAIN EFFECTS

Environmental factors and terrain affect smoke cloud behavior. Steering winds, temperature gradients and the type of terrain are important for accurately predicting smoke cloud travel. See FM 3-6, *Field Behavior of NBC Agents (Including Smoke),* for more detailed information.

WEATHER

Meteorological conditions that have the most effect on smoke screening and munitions expenditures (including the deployment smoke generators) include wind, temperature gradients, humidity, precipitation, and cloud cover.

WIND

The weather condition with the greatest impact on smoke operations is wind. Both wind direction and wind speed play a significant role in almost everything that deals with smoke operations. These factors are important in estimating equipment, munitions, and fog oil requirements for a smoke operation.

Wind direction determines where smoke must be released and where it will travel. There are four different types of wind directions that affect smoke operations: head winds, tail winds, flanking winds, and quartering winds. Favorable wind directions in relation to the smoke objective are the tail, quartering, and flanking winds.

Head winds are those blowing from the smoke objective directly toward the smoke source and are unfavorable for smoke generator operations.

Tail winds, the most favorable for smoke operations, blow toward the smoke objective from behind the smoke source.

Flanking winds blow directly across the smoke objective and the smoke source and are generally favorable for smoke operations.

Quartering winds blow between the other winds toward the smoke objective.

WEATHER G-1
TERRAIN EFFECTS G-3

It is important to make the distinction between those surface wind directions just discussed and steering winds. Steering winds occur between 6 meters and 200 meters above the earth's surface. They are the winds that actually carry the smoke and determine the direction of smoke travel.

Wind speed has as much influence on smoke behavior as wind direction has. Low wind speed or calm conditions allow smoke to remain in the target area for a longer period of time. In addition, some types of smoke behave differently at different wind speeds. For example, white phosphorus (WP) tends to pillar if winds are less than 9 knots (17 kilometers per hour). HC smoke rises when the wind speed is less than 4 knots (7 kilometers per hour), and it is torn apart by wind speeds over 13 knots (24 kilometers per hour). Smoke from mechanical smoke generators may be effective in higher wind speeds because of the great volume produced.

TEMPERATURE GRADIENTS

Temperature, by itself, has no direct relationship with making effective smoke. It does, however, have an indirect relationship, which is a result of temperature gradients. Temperature gradients are difficult to obtain and such information is not normally available. However, it is imperative to try and get representative data. This can be possibly obtained from a nearby airport or other source of weather data. Temperature gradients are determined by comparing the air temperature at 0.5 meter above the ground with the air temperature at 4 meters. Three types of temperature gradients influence smoke: unstable (lapse), neutral, and stable (inversion).

Unstable

An unstable (lapse) condition exists when air temperature decreases with an increase in altitude. This condition is characterized by vertical air currents and turbulence. Thus, smoke tends to break up and become diffused. Lapse conditions are best for producing smoke curtains.

Neutral

A neutral condition exists when air temperature shows very little or no change with an increase in altitude. Neutral conditions also exist when the wind speed is greater than 9 kilometers per hour. Under this condition, vertical air currents are very limited. Neutral conditions are best for smoke hazes and smoke blankets; however, this is not the most favorable temperature gradient for smoke.

Stable

A stable (inversion) condition exists when the air temperature increases with an increase in altitude. This condition greatly limits vertical air currents. A smoke cloud produced during inversion conditions lies low to the ground and may reduce visibility at ground level. Inversion conditions are excellent for smoke hazes and smoke blankets but only if there is enough wind to carry the smoke over the target area.

HUMIDITY

Practically all smoke particles absorb moisture from the air. Moisture increases particle size and density and makes the smoke more effective. Most smoke munitions produce a denser (thicker) smoke when the humidity is high than when it is low; therefore, high humidity is generally favorable for smoke employment. Humidity has no effect on fog oil smoke.

PRECIPITATION

Since light rains decrease visibility, less smoke gives concealment during these rains. Heavy rains and snow reduce visibility; therefore, smoke is rarely needed for concealment during those conditions. When used during periods of precipitation, smoke tends to remain close to the ground and spread out over a large area. When used during periods of falling or blowing snow, the snow crystals will remove smoke from the air, reducing obscuration effectiveness.

CLOUD COVER

The amount of clouds in the sky gives an indication of how smoke will act on the battlefield. The general rule is when the sky is covered with clouds, the atmosphere is relatively stable and the conditions are generally favorable for making smoke.

TERRAIN EFFECTS

Since smoke is carried by the wind, it usually follows the contours of the earth's surface. Therefore, the type of terrain over which the smoke travels has a tremendous impact on how effective the smoke coverage will be in a specified area. Smoke will act differently over the different types of terrain.

FLAT, UNBROKEN TERRAIN AND OVER WATER

On flat, unbroken terrain, and over water, the individual smoke streamers take longer to spread out and mix with other streamers. Therefore, the uniform phase will usually develop a greater distance downwind.

OBSTRUCTIONS

Obstructions, such as trees and small buildings, tend to break up smoke streamers. These streamers re-form, cover a much larger area, and eventually create a more uniform cloud. This uniform cloud develops much quicker and closer to the smoke source than if the terrain were open. A wooded area that contains an abundance of obstructions is the most favorable type of terrain for smoke generator operations.

LARGE HILL MASSES AND MOUNTAINS

Steep hills and mountains tend to split winds. The winds eddy around the hills and mountains as well as over them. Large hill masses and rugged terrain cause strong cross currents. These currents disperse smoke excessively and create holes and unevenness in the smoke screen. In addition, thermally induced slope winds occur throughout the day and night. These conditions make it extremely difficult to establish and maintain a smoke screen. Wind currents, eddies, and turbulence in mountainous terrain must be continuously studied and observed.

SLOPES AND VALLEYS

In areas where there are valleys and other types of slopes, the climatic conditions are usually different at different times of the day. These areas are characterized by thermally induced slope winds that occur throughout the day and night. During the daytime, the heating effect causes these winds to blow up the slope, and they are referred to as up-slope winds. At night, the cooling effect causes the winds to blow down the slopes, and they are called down-slope winds. This is a very general rule; however, it is one that needs to be kept in mind when planning smoke operations.

APPENDIX H
RECOVERY TECHNIQUES

If an M1059 is disabled, gets stuck, or will not start, the squad must get it moving as quickly as possible. A stationary vehicle is vulnerable to direct, indirect, and air-delivered munitions. This appendix covers towing a disabled M1059, starting it by towing or using a slave cable, retrieving it if it is stuck in mud or immobilized on an obstacle, safety considerations for recovery operations, and how to disable the vehicle if it has to be abandoned. For additional techniques, see FM 20-22.

Because the immobilized M1059 is such a vulnerable target, personnel not involved in the recovery should be in position to provide security. The caliber .50 machine gunner should stay at his station and be ready to engage targets as required. Squad members picked to provide local security should dismount and be stationed away from the vehicle.

If the vehicle cannot be recovered quickly, the platoon leader may decide to redistribute men and equipment among the other vehicles. The driver and caliber .50 machine gunner may be left with the disabled vehicle to wait for help, or the vehicle may have to be abandoned if the enemy situation warrants.

TOWING

The M1059 may have to be towed when disabled or stuck or to start its engine. The M1059 is equipped with towing eyes and shackles on the front and a tow pintle in the rear of the vehicle. (See figure H-1.) It also has a tow cable stowed on the outside of the rear ramp.

Normally, the terrain or enemy situation will dictate the way to tow the M1059. When not exposed to enemy fire, either the highway or the cross-country tow may be used. When exposed to enemy fire, the combat tow is used. Before any towing hookup is begun, the master switch should be OFF, the laterals locked, and the range selector placed at N (neutral). Once all connections for towing have been made, the laterals are released.

TOWING H-0
STARTING VEHICLE WITH SLAVE CABLE H-3
RECOVERY H-4
SAFETY H-7
ABANDONING THE M1059 . . . . . H-8

TOWING TECHNIQUES

Highway Tow

When towing an M1059 on a highway, it is best to use a recovery vehicle and the recovery vehicle's tow bar. If a recovery vehicle is not available, another M1059 may be used. Attach the tow bar to the front towing eyes of the disabled vehicle. When a tow bar is used, a driver is not required in that towed vehicle. When recovery is to be at speeds of less than 10 mph and distances are less than 30 miles, place the range selector in the N range. When anticipated recovery exceeds 10 mph and 30 miles in distance, the universal joints between final drives and differential must be removed before towing can begin. (See figure H-2.)

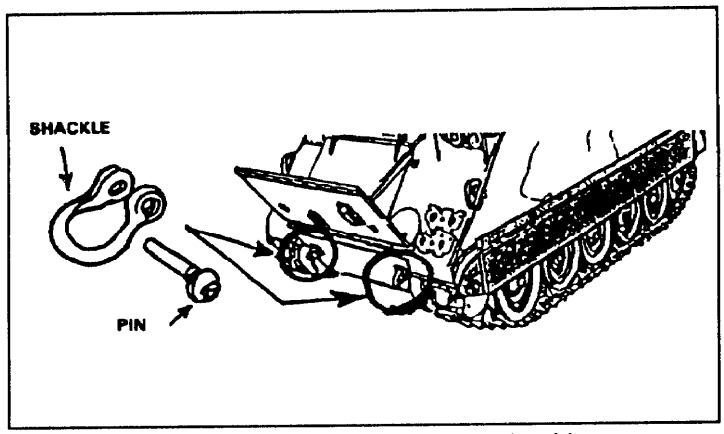


Figure H-1. Towing eyes and shackles.

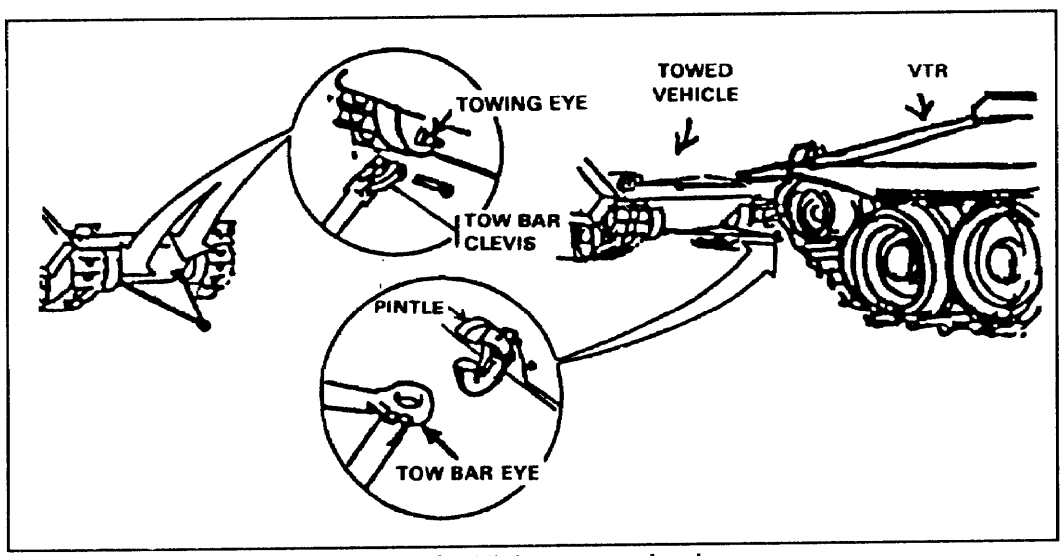


Figure H-2. Highway tow hookup.

Cross-Country Tow

To tow a vehicle cross-country, use two cables. It is best to cross the cables in an X position to keep the two vehicles aligned. To tow the vehicle forward, attach the cables to the front eyes of the disabled vehicle and the rear eyes of the towing vehicle. The vehicle may also be towed moving backward. A driver is required in the towed vehicle to apply the brakes to prevent it from overrunning the recovery vehicle on downgrades or when stopping. Never tow an M1059 with a cable when its universal joint is disconnected; the driver will have no braking or steering ability. (See figure H-3.)

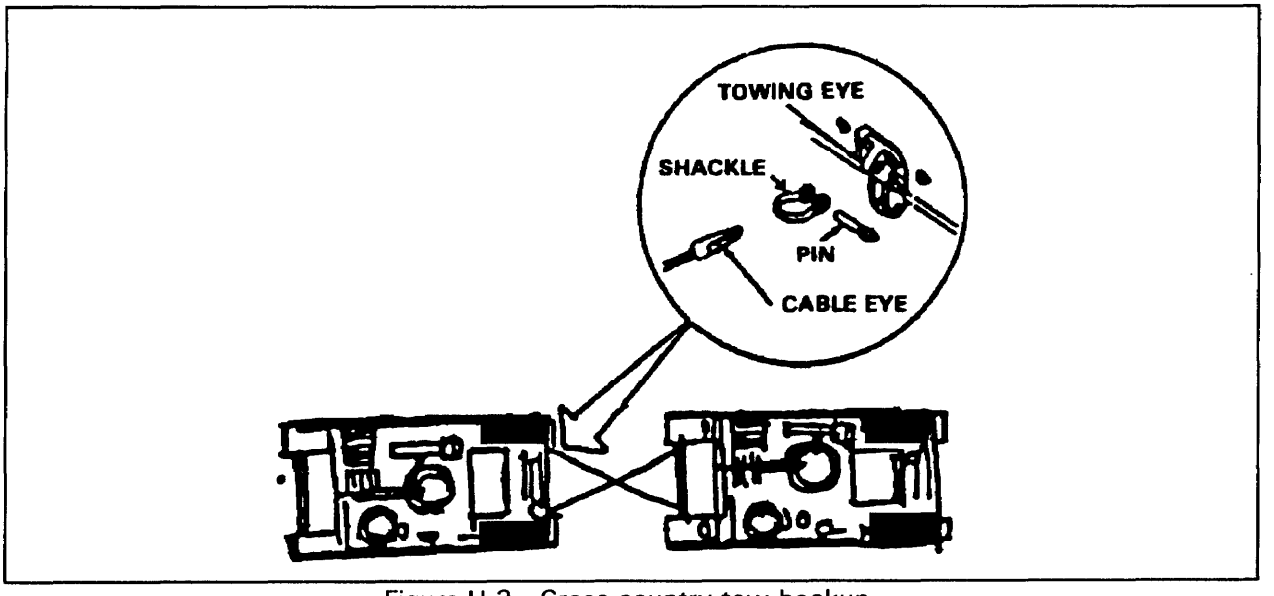


Figure H-3. Cross-country tow hookup.

Combat Tow

When it is necessary to make a towing connection under fire, use the combat tow by a recovery vehicle to minimize exposure of personnel. Attach a tow bar or tow cable to the recovery vehicle's tow pintle before the vehicle moves to the disabled vehicle. Then move the recovery vehicle into the area and back up as close as possible to the back of the M1059, while still allowing the ramp door to open. One soldier then connects the free end of the V-chain or tow cable to the rear tow pintle. (Smoke grenades can be used during the hookup to minimize the exposure of the vehicles and personnel to fire.) After hookup, close the ramp door and move the recovery vehicle out with the disabled M1059 in tow. This method may be used with either the APC or another recovery vehicle. As with a cross-country tow, a driver is required to operate the brakes of the towed vehicle. The towed vehicle's range selector must be placed in N. (See figures H-4 and H-5.)

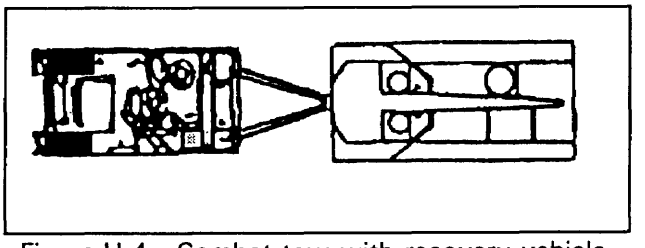


Figure H-4. Combat tow with recovery vehicle.

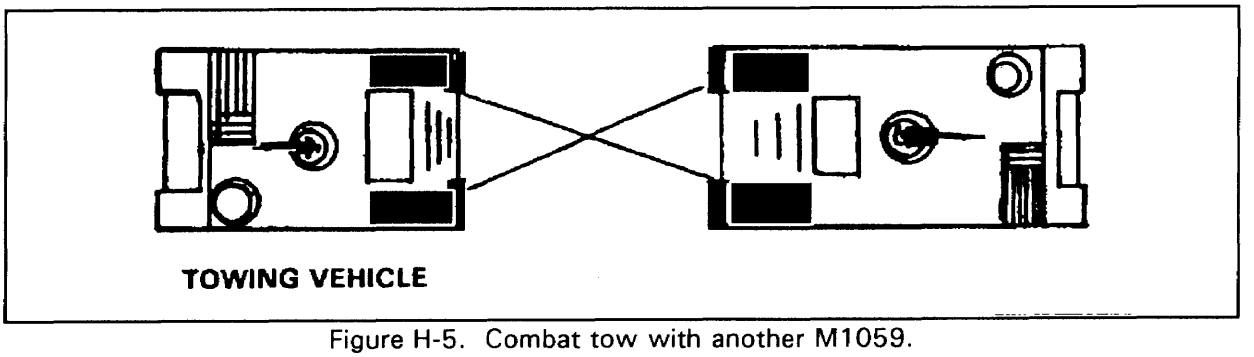


Figure H-5. Combat tow with another M1059.

Tow Starting

When an M1059 cannot be started using a slave cable, it may be started by towing. After securely attaching a tow vehicle to the disabled vehicle and doing all the before-operation preventive maintenance checks and services (TM 9-2300-257-10), the master power switch is on and fuel shut-off is pushed in. With the transmission range selector in N, release the M1059 brake levers and tow it forward until its speed reaches 20 to 25 mph. The driver then moves the transmission range selector to the 1-3 position and presses the accelerator about halfway. (See figure H-6.)

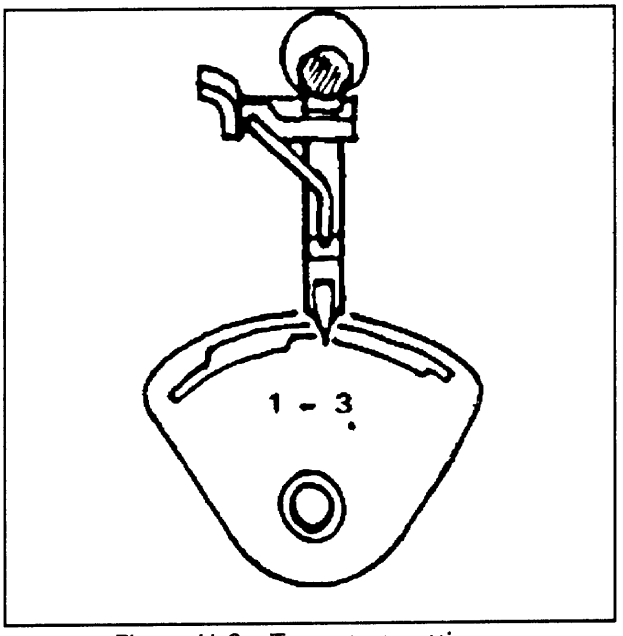


Figure H-6. Tow start settings.

When the engine starts, the driver moves the transmission range selector to N range. The driver should signal the towing vehicle with his horn or by visual signal so that both vehicles can be brought to a stop. The cables or tow bar are then disconnected.

The vehicle should not be left in any driving range for more than 5 seconds while towing. If the engine does not start, shift back to N for a few seconds before trying again. If the engine will not start in three tries, notify the maintenance contact team.

STARTING VEHICLE WITH SLAVE CABLE

When the vehicle's battery is dead or missing, the engine can be started using a slave cable connected to any 24-volt DC power source.

Before the slave cable is connected, the master switch on both vehicles must be off. The slave cable is connected to the slave receptacle in the driver's compartment.

Once the slave cable is connected and both vehicles have turned on the master switches, the engine can be started in the same way as with its own batteries. When the engine starts, it should be left running while the slave cable is disconnected. The same process can be used to start another vehicle with the M1059 as the 24-volt DC outside power source. (See figure H-7.)

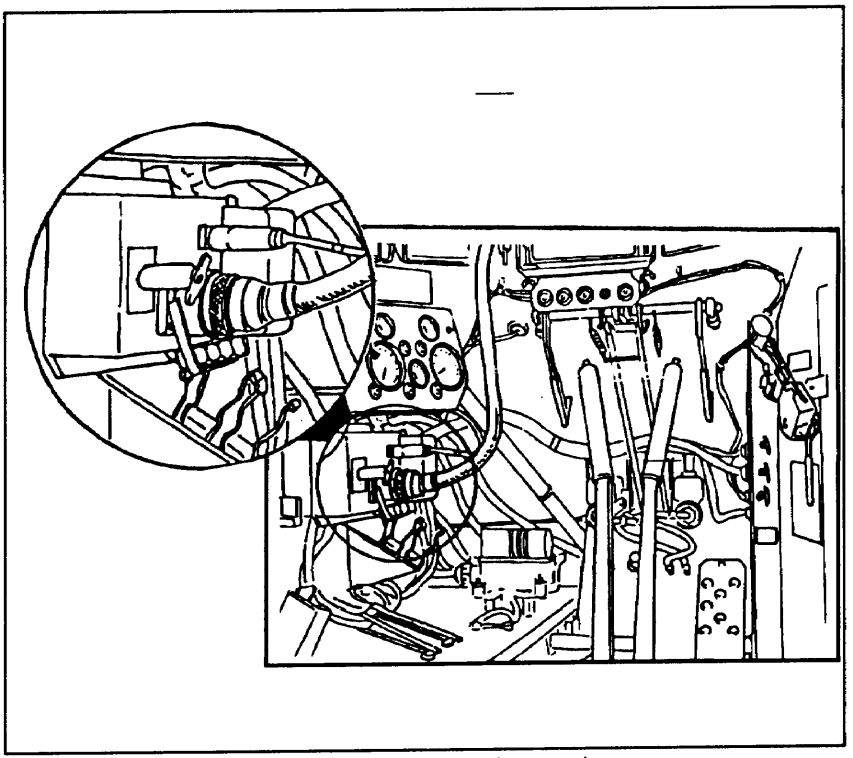


Figure H-7. Slave cable starting.

RECOVERY

Vehicles often become bellied (high centered) on high stumps, rocks, ridges, or mire. In this position, the M1059 has no traction and is stuck.

VEHICLE BELLIED IN MIRE

To recover a vehicle stuck in mire, a log should be obtained that is long enough to space the width of the vehicle and large enough to support the vehicle's weight. Two cables are used to attach the log to the tracks, one on each track. Place the log against both tracks. Place the tow cable so that one end of the cable goes over the log and through one track from the inside. Place the other end of the tow cable is placed underneath the log. Connect the ends of the cable with a towing shackle and pin. The cable should be connected on the outside of the track for easy disconnecting. Use the same method to attach the log to the track on the other side of the vehicle.

By gradually applying power to the tracks, the slack in the cables will be taken up, pulling the log underneath the tracks until it contacts the mire, and anchors the tracks, letting the vehicle move. (See figures H-8 and H-9.)

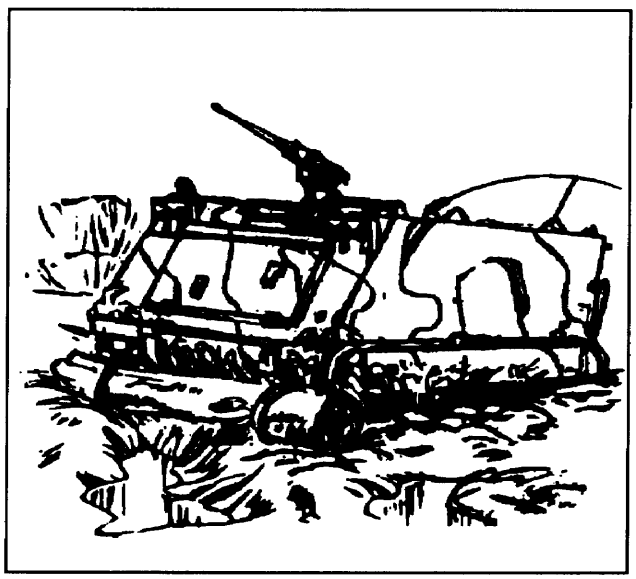


Figure H-8. Mired M1059 recovery.

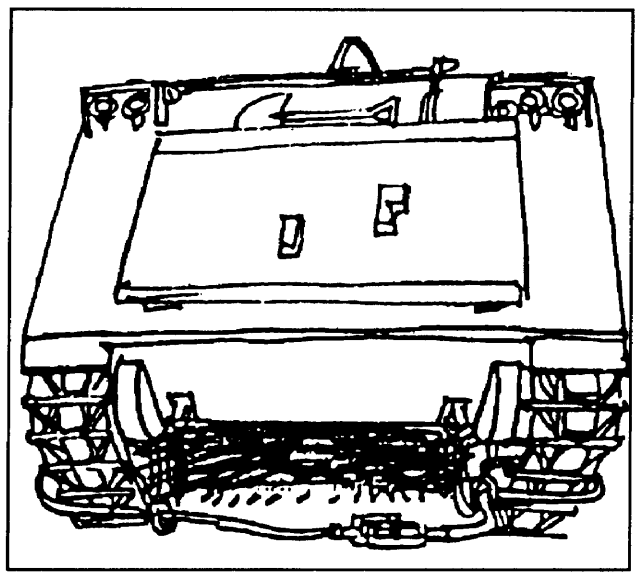


Figure H-9. Anchoring tracks.

CAUTION
TO PREVENT DAMAGE TO THE TOW CABLES AND TRACKS, STOP THE VEHICLE BEFORE THE LOG REACHES THE FENDERS IN THE FRONT OR REAR OF THE M1059.

VEHICLE BELLIED ON HIGH STUMPS, ROCKS, OR RIDGES

For a bellied disablement other than mire, the tracks can be anchored using just the two tow cables. Hook the tow cables together, attach to both tracks by passing the ends of the cables through the tracks from the outside, and attach them together in the center with towing shackles and pins.

When power is applied to the tracks, the cable will contact the obstacle and anchor the tracks. The same caution applies- -stop the vehicle before the cables reach the fenders.

NOTE

If all methods listed above fail to free the vehicle,the leader must call for the M578 from the recovery section.

RECOVERY KITS

Capstan Kit

Capstan kit (NSN 2540-00-933-3570) can be used to ease the M1059 over steep or slippery banks and to ease the M1059 over steep or slippery banks and through boggy areas. If the M1059 does not have a kit, one can be ordered using the national stock number. The kit has two adapters permanently bolted to the hub of each driver sprocket, two capstan drums (bolted on each adapter [with a T-bolt]), four 100-foot and two 50-foot lengths of l-inch nylon rope with shackles, and two marine anchors with recovery cables.

To use the kit--

- Bolt drums with T-bolts to the adapters, making sure that laterals are locked.
- Thread a length of rope through the outside flange of each drum.
- Make two or three turns over the end of the rope to anchor it, being sure that the rope extends from under the drums.
- Set the marine anchors in line with the drums and press them into the ground to give them a good start.
- Eliminate all rope slack before attaching the ropes to the anchors.
- Apply vehicle power slowly until the tracks are turning equally. Keep a slow, steady, equal pull so that the anchors will dig in evenly.
- As the drums winch the ropes, the M1059 will move out. Use a guide to make sure that the rope winds up properly.

The anchors can be used side-by-side or in tandem. Because the anchors may go underground, be sure to attach the recovery cables to them before pulling. Recover the anchors by pulling the recovery cables with the M1059.

APCAT KIT

The APCAT (APC anchoring tracks) kit is another handy self-recovery aid. It is locally fabricated and consists of two track anchor blocks and two 100-foot lengths of rope. (See figure H-10.)

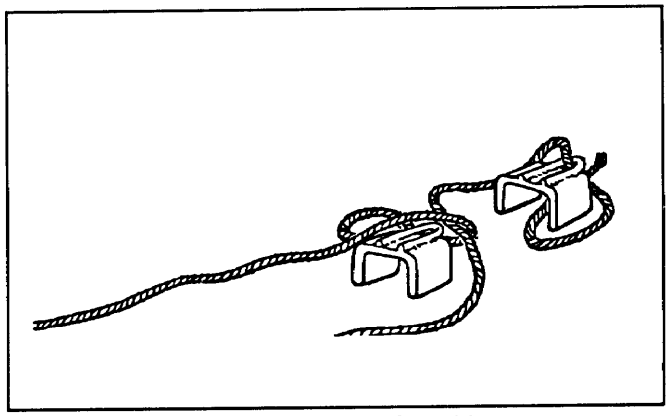


Figure H-10. APCAT kit.

To use the kit, attach an anchor block on each track and tie the rope to the loops on the blocks and then to a good anchor.

As the driver applies vehicle power, the tracks anchor themselves to the blocks while the vehicle moves out the length of the track. The blocks can then be retied to the ropes with a half-hitch and the process repeated. (See figure H-11.)

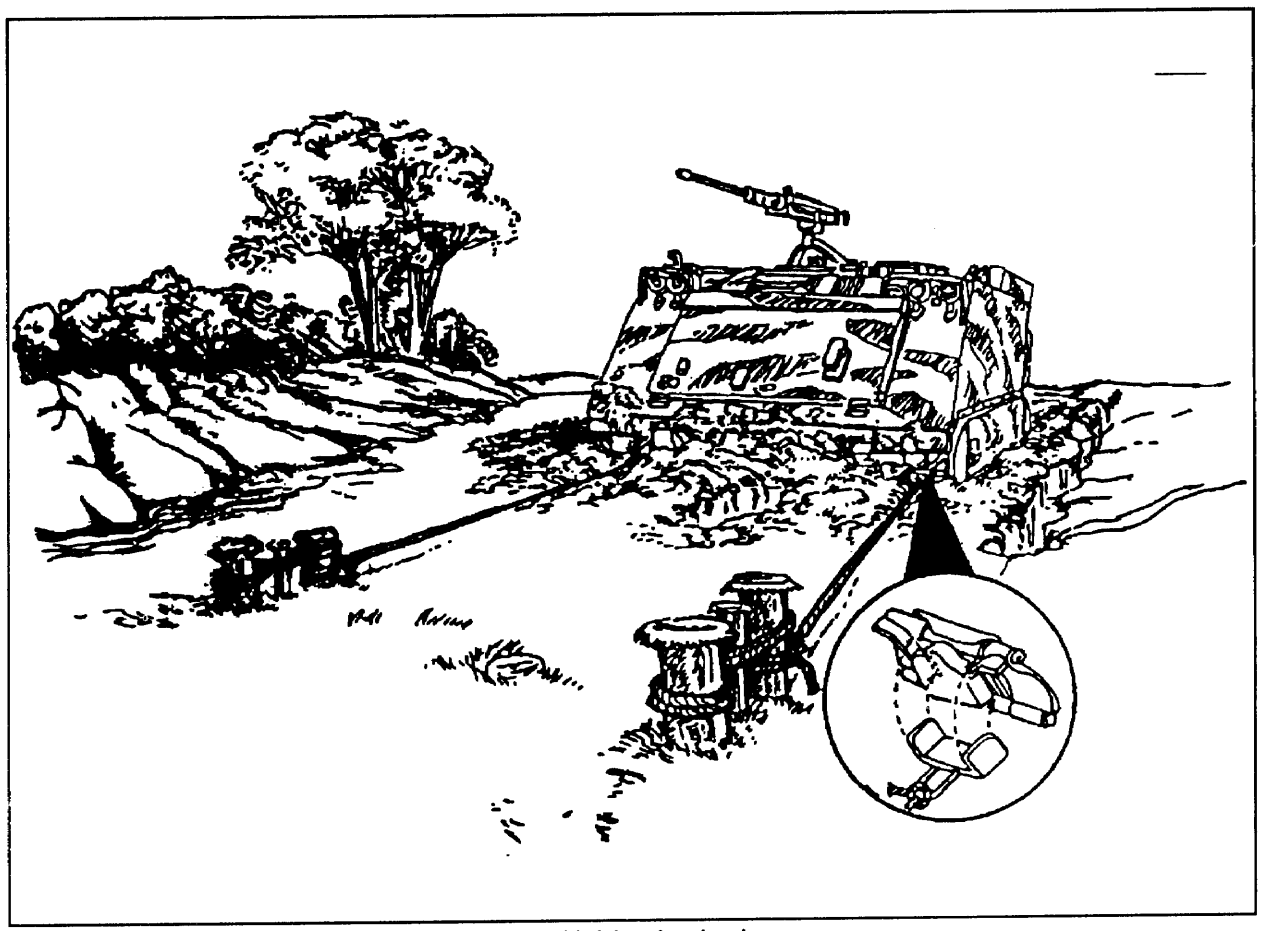


Figure H-11. Anchoring.

SAFETY

Recovery operations are dangerous. Maximum care must be taken to prevent injury to personnel and damage to the vehicle and equipment. Listed below are general safety precautions to consider before trying any recovery operations.

HANDLING CABLES

Personnel handling wire ropes or cable should wear heavy leather-palmed gloves to prevent hand injuries or cuts from broken or frayed wires. A moving cable should never be allowed to slide through the hand, even if gloves are worn. (See figure H-12.)

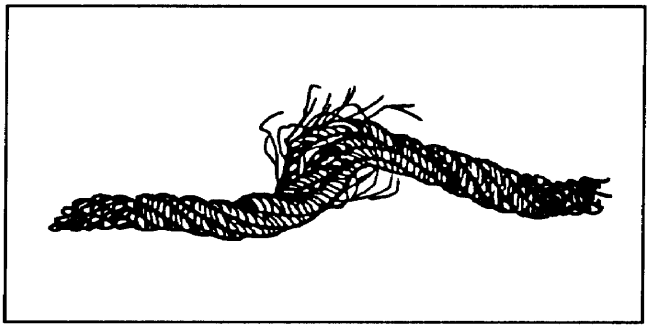


Figure H-12. Frayed cable.

CARE OF CABLES

Cables should not be drawn over rocks or around sharp corners. Heavy objects should not be dropped on a cable. They could nick or burr the wires, causing them to break. All loops formed in a cable should be removed before force is applied.

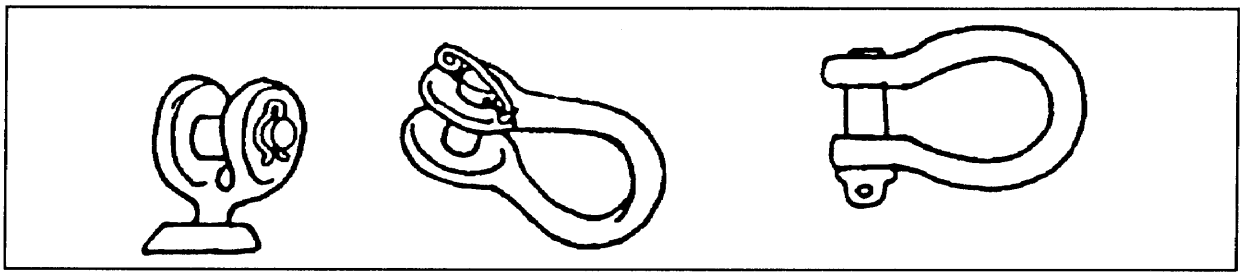


Figure H-13. Use of hooks.

SAFETY KEYS

All safety keys or pins should be in place before force is applied.

HOOK POSITIONS

If a hook is used to pull the vehicle, the open part (throat) should point upward. If the hook should straighten out from overload, the rigging will tend to go downward, not upward unrestrained.

RIGGING BETWEEN VEHICLES

When erecting rigging between vehicles, engines must be off and vehicle brakes applied to prevent possible injury to rigging personnel or damage to vehicles.

INSPECTING RIGGED EQUIPMENT

Equipment should be thoroughly inspected before the recovery operation starts. The recovery vehicle operator should be directed to work the winch enough to remove slack from the rigging, then stop the operation and shut off all engines. The rigging can then be inspected without endangering the personnel. Likewise, if a vehicle is being towed, power should be applied slowly until all tow cable slack is taken up. Again, shut off engines and inspect rigging before going on.

OPERATOR/DRIVER SAFETY

Operators and other personnel, in both the recovery vehicle and disabled vehicle, should keep their hatches closed during a recovery operation and use their periscopes to see hand signals.

SAFE LOCATION OF PERSONNEL

Before a pull starts, all personnel on the ground must be directed to move safely away from rigging before the operators apply power. A taut cable, released by a sudden break, can backlash and cut a person in half. The minimum safe distance is one and a half times the length of the longest line.

For safe control of a recovery operation, there should be only one signalman. The operators must know the meaning of signals used and must act only on those signals. The signalman must be in a safe place where the operators can observe his signals.

ABANDONING THE M1059

Every effort should be made to recover a disabled M1059. If the enemy situation is so critical that the vehicle cannot be recovered, men and equipment may have to be crossloaded on other vehicles and the disabled M1059 abandoned. An abandoned M1059 should be of no immediate use to the enemy and yet should be readily repairable by friendly forces.

If the carrier is to be abandoned, secure the weapons, radios, and equipment, and take one of the following actions:

- Remove the fuel line from the fuel filter to the engine block.
- Remove the shaft between the transmission and differential.
- Break a track and remove at least two shoes.

In an extreme situation, place a thermite grenade on the top of the engine. TM 9-2300-257-20 has detailed information on the destruction of the M1059.

DECISION TO ABANDON M1059

The decision to abandon a vehicle is the responsibility of the platoon leader or senior man present. The M1059 should be stripped of all equipment possible and the M1059's location reported to the next higher headquarters as covered in the SOP.

APPENDIX I
GARRISON STORAGE OF FOG OIL

All smoke units in garrison, and possibly during war, will establish large fog oil dumps to support training and operations. This appendix will describe the proper techniques for storing fog oil to preclude environmental damage and to maximize the shelf life of the fog oil.

Set up, in the area, a separate stocking area for each product and type of package. If you have an area for each, you can easily inventory and control the stock. You are also less likely to incorrectly identify the product. Use a block system to separate large amounts of stored supplies so that the entire stock of one product is not lost if there is an enemy attack or a fire. Plan the exact layout according to local conditions and safety requirements (See Appendix F, Safety, for guidance).

55-GALLON DRUMS

Plan the layout of a stacking area for 55-gallon drums according to the type of product in the drums and the terrain. Petroleum products are classified as light-or low-flash (for example, fog oil, diesel fuel) and heavy or high flash (for example, MOGAS). Store low-flash and high-flash products in separate blocks. There should be 50 to 150 foot wide aisles between blocks. Blocks are made up of up to nine 70 square foot sections, and each section is divided into five parallel units with nine foot wide aisles between double rows of drums. You can reduce this aisle width to four feet if this leaves you enough room to handle the product. Rows of drums containing low-flash products must be no more than 35 drums long and three tiers high. A suggested, but not mandatory, layout of a stacking area for 55-gallon drums is at figure I-1.

STACKING FILLED 55-GALLON DRUMS

Stack drums horizontally in double rows with the closures (bungs and vents) facing the aisles at the 3 o'clock and 9 o'clock positions. Leave at least one foot of space between the double rows. This should be enough space to allow you to work with drum-handling attachments and to inspect drum butts and chimes. There are two basic methods of stacking drums--

- Nested Stacks.
- Dunnaged Stack.

55-GALLON DRUMS I-1
STACKING FILLED 55-GALLON DRUMS I-1
ISSUING PRODUCT I-4

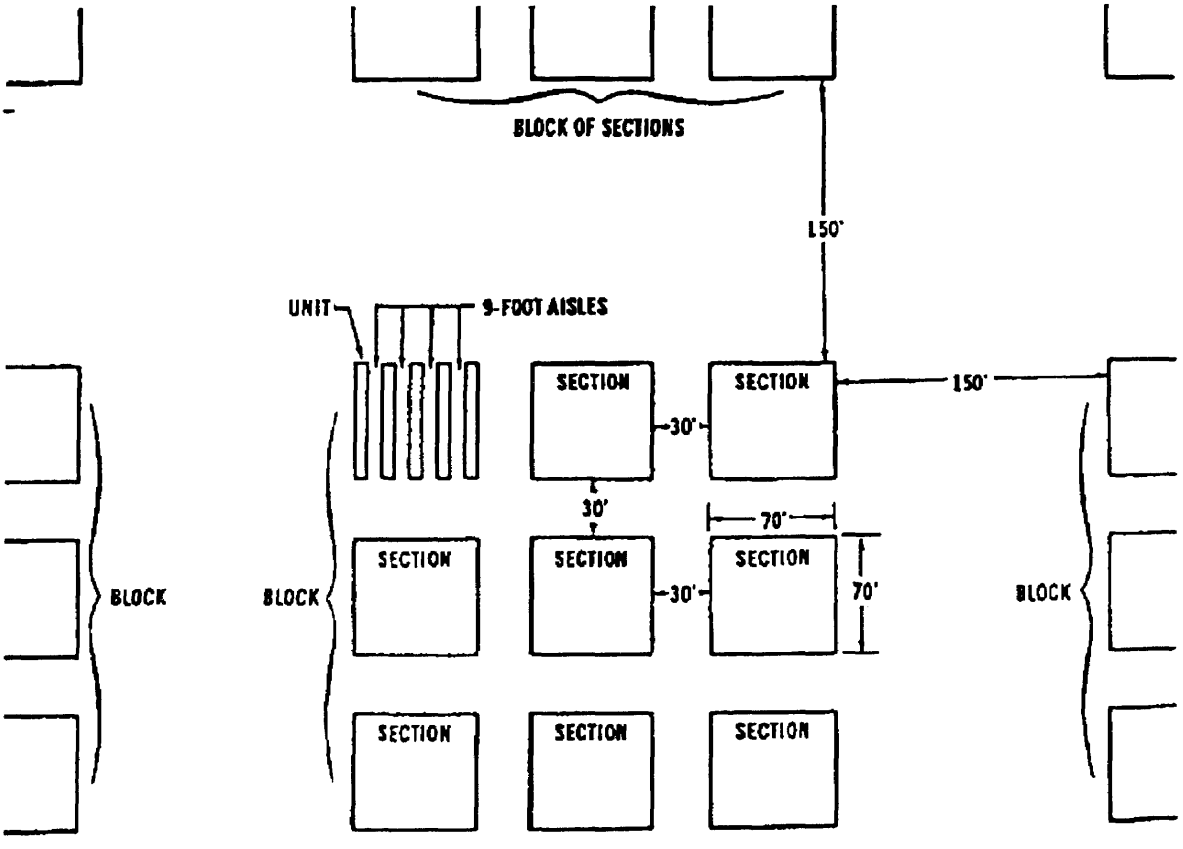


Figure I-1. Area layout.

Nested Stacks

• Lay out a 70-foot-square section, and then divide the section into five units. If you are storing a small number of drums you may use a smaller square.

• Make a foundation for each unit of drums by laying out four 70-foot rows of 2 by 6 inch lumber or other suitable dunnage. Stand the lumber on edge, attaching cross braces between the rows to hold the lumber in place, as in figure I-2.

• Build bracings at the ends of the rows to keep the drums from rolling or toppling (figure I-2).

• Lay 35 drums on their sides in each of the two rows to form the first tier. Place the drums in the rows with their bungs and vents facing the aisle, and leave at least one foot of space between the double rows. Ensure that the bungs and vents are in a horizontal line and below the surface of the liquid. This is known as flooding the bungs and vents, and it ensures a tight seal and cuts down on container breathing.

• Place a second tier on top of the first, and nest each drum between the two drums below it. Place the drums as outlined above. The finished unit contains 204 drums and a complete section of five units contains 1,020 drums.

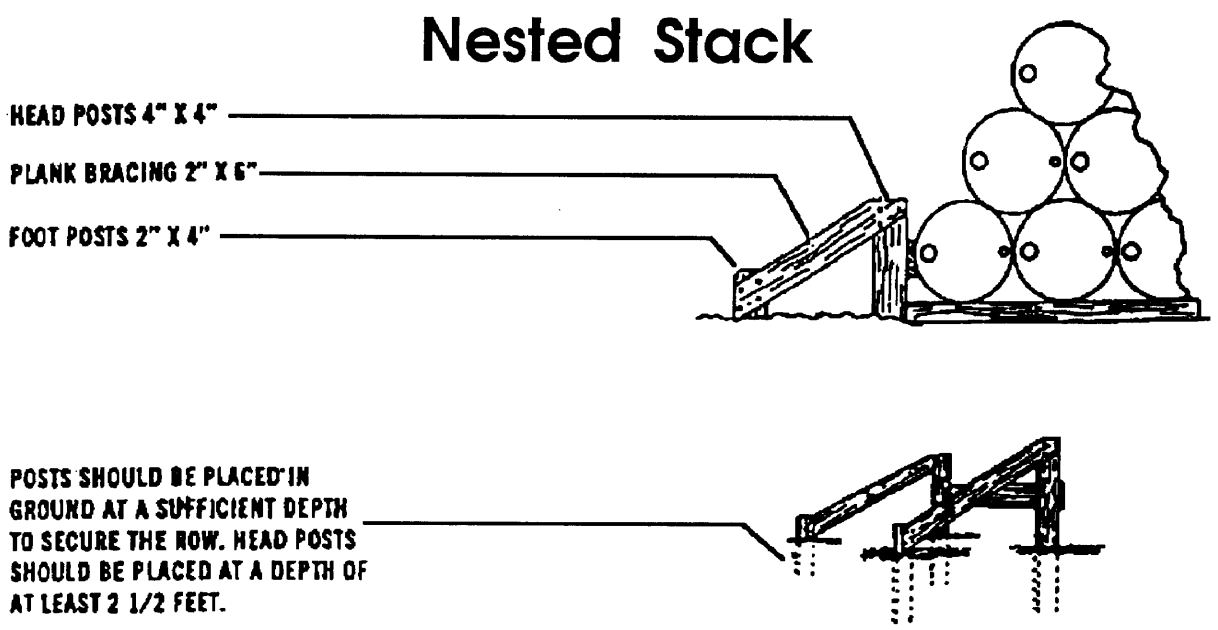

Nested Stack
HEAD POSTS 4" X 4"
PLANK BRACING 2" X 6"
FOOT POSTS 2" X 4"
POSTS SHOULD BE PLACED IN GROUND AT A SUFFICIENT DEPTH TO SECURE THE ROW. HEAD POSTS SHOULD BE PLACED AT A DEPTH OF AT LEAST 2 1/2 FEET.

Figure I-2. Nested stack.

Dunnaged Stack

• Lay out a 70-foot square section, and then divide the section into units. If you are storing a small number of drums you may use a smaller square.

• Make a foundation for each unit of drums by laying out four 70-foot rows of 2- by 6-inch lumber or other suitable dunnage. Stand the lumber on edge, attaching cross braces between the rows to hold the lumber in place, as in figure I-3.

• Attach wooden cleats to the dunnage at the ends of each row (figure I-3).

• Build the first tier of the unit as described in the section on nested stacks.

• Place two double rows of 1-inch planks on top of the first tier. Then attach wooden cleats to the planks at the end of each row (figure I-3).

• Place a second tier on top of the first, and nest each drum between the two drums below it. Ensure that the bungs and vents are in a horizontal line and below the surface of the liquid. If you stack the drums in a pyramid (figure I-4), position them vertically, center them in the upper tier directly over those in the tier below.

• Build the third tier in the same way you built the second tier.

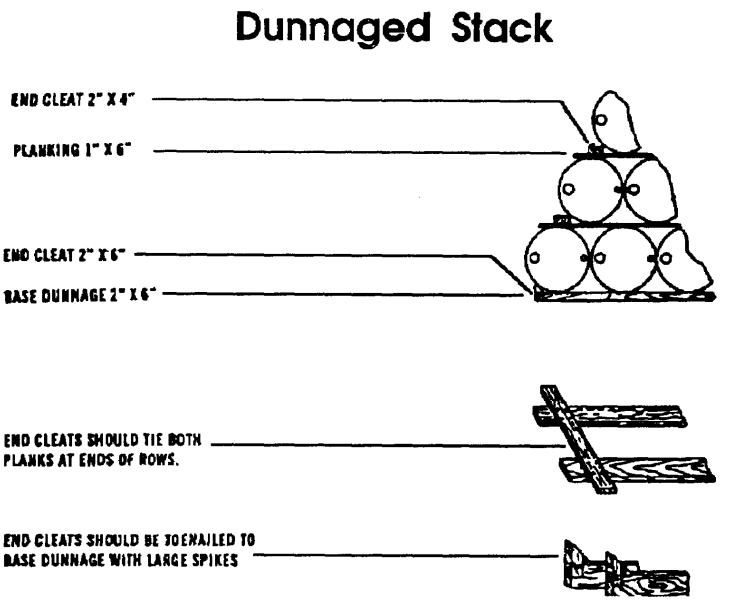

Dunnaged Stack
END CLEAT 2" X 4"
PLANKING 1" X 6"
END CLEAT 2" X 6"
BASE DUNNAGE 2" X 6"
END CLEATS SHOULD TIE BOTH PLANKS AT ENDS OF ROWS.
END CLEATS SHOULD BE TOENAILED TO BASE DUNNAGE WITH LARGE SPIKES

Figure I-3. Dunnaged stack.

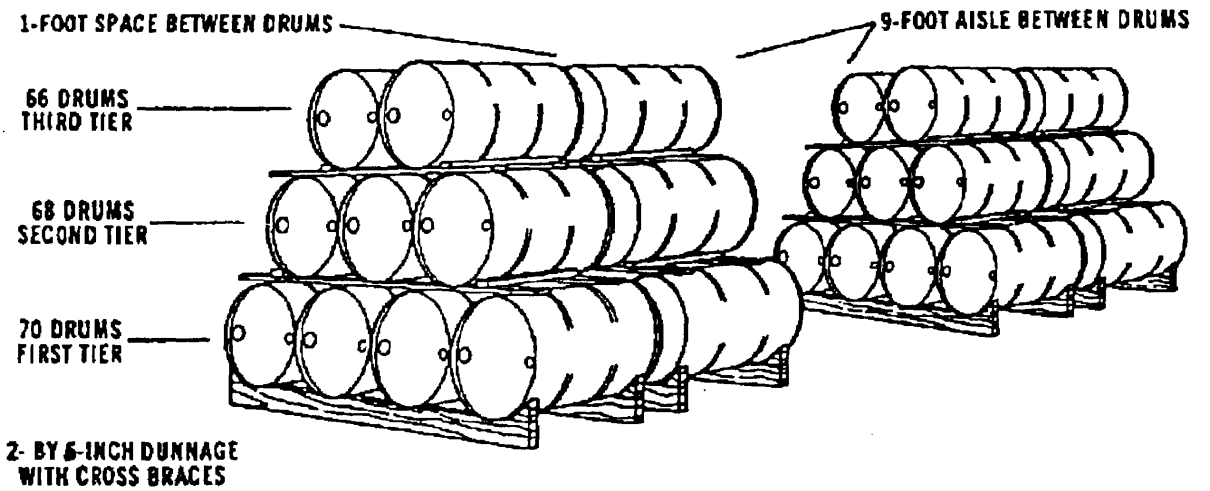

1-FOOT SPACE BETWEEN DRUMS
9-FOOT AISLE BETWEEN DRUMS
66 DRUMS THIRD TIER
68 DRUMS SECOND TIER
70 DRUMS FIRST TIER
2- BY 6-INCH DUNNAGE WITH CROSS BRACES

Figure I-4. Dunnaged stack of filled 55-gallon drums.

ISSUING PRODUCT

You must brace containers you load aboard transport vehicles to ensure their safe transit. Seal all closures tightly, and stow the containers on their bases. With 55-gallon drums, stow them with the bung and vent up. Your transport vehicle must be equipped with a fire extinguisher having a rating of 10-B-C or greater. Never exceed the load limit of a vehicle.

APPENDIX J
FRATRICIDE PREVENTION

Fratricide means killing friendly forces. The lack of coordination between friendly forces, the inability to distinguish friend from foe, and the stresses of combat on troops with little combat experience are major factors causing fratricide. In each war, especially those that occurred during the twentieth century, a significant number of soldiers have been killed or wounded by friendly fire. Under NBC conditions, the risk of fratricide greatly increases.

Nearly a quarter of the casualties that American forces experienced during the Persian Gulf War were the result of friendly fire. Thirty-five of the 148 Americans killed (21 soldiers and 14 marines) were officially listed as killed by friendly fire in Operation DESERT SHIELD/ DESERT STORM.

The emotional impact of fratricide can be more destructive to a unit's morale and ultimately its fighting capacity, than the actual impact on combat power. Leaders must avoid this needless loss or life and combat power. What is fratricide? What are its causes? How can we reduce the risk of casualties to friendly fire on the fast paced, decentralized battlefields of the future?

CAUSES OF FRATRICIDE

Anyone who has not experienced the degree of fear and uncertainty that accompanies combat cannot understand the true dimension of the problem of "friendly fire." Fratricide has occurred in every war. Americans have mistakenly killed their own forces in all our wars.

Factors that Cause Fratricide

- **Inexperienced, Green Troops**
- **Poor Situational Awareness**
- **Inadequate Fire Controls**
- **Combat/Identification Failures**

CAUSES OF FRATRICIDE J-1
ACTIONS REDUCING RISK OF
FRATRICIDAL ENGAGEMENT J-3

INEXPERIENCED, GREEN TROOPS

Of all the reasons for fratricide, inexperience is the most deadly. Inexperienced troops are more likely to be the target of friendly fire.

POOR SITUATIONAL AWARENESS

- **Land Navigation Failures.** Never easy, navigation is often complicated by difficult terrain or weather and visibility. Navigation problems can cause units to stray out of sector, report wrong locations, become disoriented, or employ fire support weapons from wrong locations. As a result, friendly units may collide unexpectedly or engage each other erroneously.

- **Reporting, Crosstalk and Battle Tracking Failures.** Commanders, leaders, and their CPs at all levels often do not generate timely, accurate, and complete reports or track subordinates as locations and the tactical situation change. Commanders are, therefore, unable to maintain situation awareness. This distorts the picture at each level and permits the erroneous clearance of support fires and violations of danger close.

- **Known Battlefield Hazards.** Unexploded ordnance, unmarked and unrecorded minefield, FASCAM, flying debris from discarding SABOTs or failure to mark, record, remove hazards, or otherwise anticipate the threat leads to casualties.

INADEQUATE FIRE CONTROLS

- **Inadequate Fire and Maneuver.** The supported unit may fail to disseminate the minimum necessary maneuver and fire support control measures to coordinate activities on the ground. Units fail to tie control measures to recognizable terrain and events or, where necessary, create a recognition feature. Improper use or inconsistent understanding can likewise make control measures ineffective. As the battle develops, the plan cannot address obvious enemy moves as they occur and synchronization fails.

- **Fire Control Failures.** Defensive and particularly offensive fire control plans may not be developed or may fail in execution. Some units do not designate target reference points, engagement areas, and priorities. Some may designate, but fail to adhere to them. Weapons positioning can be poor, and fire discipline can break down upon contact.

- **Violating Rules of Engagement.** Lapses in unit and individual discipline or violations of the Rules of Engagement allow errors that are not merely accidents. Examples are out-of-sector engagements, unauthorized discharges, mistakes with explosives and hand grenades, charge errors, incorrect gun data and similar incidents.

COMBAT IDENTIFICATION FAILURES

- Vehicle commanders, gunners and attack pilots cannot distinguish friendly and enemy thermal and optical signatures near the maximum range of their weapons systems. However, our tactics lead us to exploit our range advantage over the enemy. During limited visibility or in restricted terrain, units in proximity can mistake each other for the enemy due to short engagement windows and decision time.

- We do not have a means to determine friend or foe, other than visual recognition of our forces and the enemy's. When the enemy and our Allies are equipped similarly, and when the enemy uses US equipment, the problem is compounded.

ACTIONS REDUCING RISK OF FRATRICIDAL ENGAGEMENT

To reduce fratricide in combat, units must conduct effective direct fire planning, clear their indirect fires, conduct thorough preparation and have excellent discipline. Other factors that can decrease fratricide casualties include standard operating procedures that designate dedicated "challenge" radio frequencies and pyrotechnic signals. Increased training emphasis on air and ground vehicle recognition is vital. Technical means of identifying friend from foe will soon aid in this effort but are not the sole solution.

DIRECT FIRE PLANNING

The quality of the direct fire planning is central to reducing fratricide. Clear plans and graphics are critical. CTC studies conducted since 1985 show that the inadequate control of direct fire systems during the execution phase of the battle is a major factor of fratricide.

Studies indicate that the overriding problem at task force level is the lack of integration of direct fire planning into the scheme of maneuver. Direct fire control measures play a vital role in this effort. Commanders should employ direct fire control measures that specifically assist in the prevention of fratricide. Engagement areas and no fire areas are an example of this type of control measure.

In addition, commanders should consider employing precise weapons engagement instructions. Air defense weapons, for example, use weapons control measures (weapons tight, hold, free and so on) to reduce friendly fire. Finally, units should employ designated signals, such as flares, to start, shift, lie and stop fires.

CLEARANCE OF INDIRECT FIRES

In past wars, artillery fratricide was a major killer. The small number of indirect fire fratricide casualties during Operation Desert Storm may not be representative of future conflicts.

Historical evidence suggests that indirect fire fratricide is still a major concern. FM 6-20-40, which covers the doctrinal concepts necessary to reduce fratricide due to artillery, says that the maneuver commander "has the final authority to approve [clear] fires and their effects within his zone." Normally, he delegates this authority to his fire support officer (FSO). When fires are targeted outside the commander's zone or sector, the FSO must make every effort to clear those fires with the commander or FSO who owns the zone. This type of coordination is crucial in reducing indirect fire fratricide.

PREPARATION

Every soldier must know the plan and must understand the commander's intent and the friendly situation. Too often, commanders and staff officers put all of their energy into creating a plan and not enough energy into ensuring that the preparation phase of the operation is conducted to standard.

Commanders must rehearse unit direct fire plans and control measures. Rehearsals make sure that the mission, intent and scheme of maneuver are understood by every soldier in the unit. If you don't rehearse it, it probably won't happen. The time invested in this process will make direct fire weapons more effective and act to reduce fratricide.

DISCIPLINE

The ground-to-ground and air-to-ground weapons systems that proliferate on today's battlefield require soldiers to make split-second decisions without the opportunity for certain identification.

To shoot or not to shoot is the question. Ultimately, it is the discipline to decide whether to pull the trigger or not that counts. Numerous incidents occurred during Operation Desert Storm in which fratricide was avoided. Discipline and strict fire control were the key in every situation in which fratricide was avoided.

US forces killed their own in the Persian Gulf at a rate four times higher than in previous wars. The short duration of the war and the fast pace of operations may have been the reason, or this increased rate may reflect the realities of a more lethal battlefield. New antifratricide technologies may help to reduce casualties, but the heart of the matter boils down to better training.

We have discussed some of the primary causes of fratricide and the consequences of adverse preconditions and contributing factors. The following will assist in minimizing fratricidal engagements.

Address fratricide contributing factors, preconditions and other elements operational risk early in and throughout the decision making process. You the leader must develop your concept for accomplishing a mission based on the commander's guidance, including the commanders intent. Following the initial METT-T analysis, the commander will state where and to what extent he is willing to accept risk. The commander will refine guidance throughout war gaming, order development, rehearsals and execution. As part of accomplishing the mission while preserving combat power, the commander should eventually identify and incorporate all necessary risk-reducing measures. Tables H-1 on the following page is a decision aid to help you to evaluate risk of fratricide.

Table K-1. Fratricide Risk Reduction Measures

	Routine Measures Low Risk	Caution	Extraordinary Measures High Risk
FIRE AND MANEUVER CONTROL	• Brief backs • Supervision • PMCS & pre-combat checks	• Lim vis rehearsal • Reinforce clear intent • Cross-level/consolidate equip	• Converging/adj forces • Rehearsals • Task force rehearsal
FIRE DISTRIBUTION PLAN	• Extensive Rehearsals • SOPs • Synchronization Matrix	• Modify task organization • Some direct fire units-wpns hold or tight • Limited visibility plan	• Multiple synchronization rehearsals • Modify plan • Limited objections
LAND NAVIGATION	• Detailed navigation plan • Reconnaissance confirms impact of terrain-weather-enemy	• Ground guides/night vision aids • Redundant navigation aids marking enemy positions	• Multi-echelon navigation • Extensive recon/centralization • Reduce equipment dependence
FIRE CONTROL AND BATTLE TRACKING	• Positive clearance of fires • Commo checks • Fire support rehearsals	• Positive clearance of fires • Restrictive control measures • SOP guides/beacons/ vectoring	• POSITIVE clearance of fires • More leaders forward • Redundant commo provide backups
BATTLEFIELD HAZARDS	• Safety discipline • Disseminate known hazards	• Vehicle hazards considered • Rehearse react to hazard • Review equip limitations	• Add intermediate objectives • Special log/maint actions • Detailed deception
COMBAT IDENTIFICATION	• Sustain CVI skills • Boresight • Cbt vehicle recognition systems	• Cbt ID enhancements • IFF expedients for exposed elements	• Clear IR friendly marking • Multiple recognition signals
FIRE CONTROL DISCIPLINE	• Review ROE • Challenge/password discipline • Inspections • Buddy systems	• Lighten load/review equip list • Simplified plan • Simplicity/repetition • Modify ROE	• Interim • Halts/assessments • Challenge/password enhancements • Rotate high stress positions
SOLDIER AND LEADER PREPAREDNESS	• Address seasonal hazards • Sustainment training • Sustain morale • Full troop leading process • Sleep plan	• Max use of transport • Abbreviated troop leading process • Refresh mission specific skills • Controlled pace in execution	• Priority of tasks • Priority of rehearsals • FRAGO only for efficiency • Request additional combat power • Don't exceed tng proficiency

APPENDIX K
PRECOMBAT CHECKS AND INSPECTIONS

PRECOMBAT CHECKS

Precombat checks (PCC) are conducted by unit leaders to ensure that the unit can perform its combat mission. The PCC can be either formal or informal depending on the current operation. The leader needs to ensure all mission essential equipment is on hand and is fully operational. PCCs ensures the unit has all weapon systems, communications equipment, NBC protective gear, vehicles, NBC equipment, manuals, and any other equipment that is authorized.

Each vehicle commander should conduct a PCC with each squad leader conducting spot checks prior to each mission. The platoon sergeant should supervise the overall precombat preparation of the platoon. Each squad leader should report the status of his squad to the platoon sergeant in sufficient time that any necessary corrective action can be taken.

The PCC/PCI form at table K-1 can be used as a checklist.

PRECOMBAT INSPECTIONS

These are more detailed and formal than PCCs and are normally conducted prior to deployment.

PRECOMBAT CHECKS K-0
PRECOMBAT INSPECTIONS . . . K-0

Table K-1. PCC/PCI checklist.

ITEM	GO	NO GO
INDIVIDUAL		
Seasonal uniform		
First aid packet complete		
Canteen full w/ M1 drinking cap		
Protective mask w/ hood		
Individual weapon magazines (6 each)		
Dog tags around neck and ID card		
MOPP uniform		
Individual weapon (clean & oiled)		
Flashlight w/ batteries		
BRIEFED ON CURRENT MISSION/SITUATION		
DRIVERS LICENSE		
VEHICLE COMMANDER		
Map w/ current overlay		
Current SOI or extract		
Watch and time hack		
LEADERS		
Map w/ current overlay		
Current SOI		
Leaders packet to include TSOP		
Watch and time hack		
Binoculars		
Night vision device w/ batteries		
Compass		

Table K-1. PCC/PCI checklist continued.

ITEM	GO	NO GO
VEHICLES		
General Equipment stored IAW load plan Topped off w/ fuel Water can full OVM stored according to load plan; clean & serviceable First aid kit complete -10's on hand Vehicle dispatched/packet POL package products		
Automotive Current 2404 on hand (pre operational check) Daily walk around PMCS conducted		
Miscellaneous Equipment Binoculars Camouflage nets and supports Aircraft panel markers Chem lights		
COMMUNICATIONS EQUIPMENT		
Radios Operational Secure functional Proper frequencies set Matching units set Antennas tied down Connectors clean Field expedient antenna kit RE-292/OE-254 antenna complete		
Telephone present w/ batteries		
Wire and reeling equipment		

Table K-1. PCC/PCI checklist continued.

ITEM	GO	NO GO
SMOKE EQUIPMENT AND SUPPLIES		
M3A4/M157 Smoke Generator Operational/PMCS Bll clean, serviceable, complete Authorized repair parts on hand Current 2404 on hand Fire extinguisher serviceable -10/-20 TM's on hand Fuel tank full		
Tank and Pump Unit Pods full Fuel cans full and tied down Pump operational Fog oil drained from pump hoses -10 TM on hand Current 2404 on hand (pre operational check) Daily walk around PMCS conducted		
Smoke Supplies Fuel cans full Smoke pots on hand Smoke grenades on hand Fog oil tanks full		
NBC DEFENSE EQUIPMENT		
Individual Equipment Protective clothing completely inspected Protective mask Serviceable Combat filters Individual decon kit present & serviceable M8 detector paper present & serviceable Hood present & serviceable Nerve agent antidote kits Convulsant antidote for nerve agents (CANA) Nerve agent pyridostigmine pretreatment (NAPP)		

Table K-1. PCC/PCI checklist continued.

ITEM	GO	NO GO
Squad Equipment NBC marking kit; complete Radiac equipment AN/VDR-2 AN/PDR-75 IM-93 AN/PDR-27 IM-174 M8A1 chemical alarm M43 detector M42 alarm Batteries CAM M11 decon apparatus DS-2 Nitrogen cylinders M13 decon apparatus		

GLOSSARY

AA - assembly area

AAR - after action report

abn - airborne

ACR - armored cavalry regiment

ACRV - artillery command and reconnaissance vehicle

aerosol - fine particles of solids or liquid suspended in air

AD - air defense

AG - advanced guard

AICV - armored infantry combat vehicle

AMC - Army Materiel Command

APC - armored personnel carrier

arty - artillery

ASG - area support group

ASP - ammunition supply point

ATGM - antitank guided missile

attenuate - reduce the effectiveness amount or force of

bispectral obscurant - an obscurant that blocks or attenuates two portions of the electromagnetic spectrum (such as visual and infrared)

blanket - See smoke blanket

BMNT - beginning morning nautical twilight

Bn - battalion

BSA - brigade support area

build-up phase - the second stage of smoke cloud production; occurs when the individual smoke streamers start to merge

CAS - close air support

CEV - combat engineer vehicle

CFL - coordinated fire line

CFV - cavalry fighting vehicle

CLOS - command line of sight

CMO - civil military operations

COSCOM - corps support command

CP - command post

CRP - combat reconnaissance patrol

CRSTA - counterreconnaissance surveillance and target acquisition

CSS - combat service support

curtain - See smoke curtain

DAG - division artillery group

decon - decontamination

det - detachment

DEW - directed-energy weapon (such as high-energy microwaves lasers)

DISCOM - division support command

DPICM - dual-purpose improved conventional munition

DS - direct support

DSA - division support area

EA - engagement area

EENT - ending evening nautical twilight

eff - effective

electro-optical system - a device that detects targets by con verting the electromagnetic radiation (visible infrared microwave) given off by the target into electric current; this current is amplified then used to power a viewer or targeting system; this devise can detect targets not visible to the naked eye

EMP - electromagnetic pulse

EO - electro-optical

EW - early warning

FA - field artillery

far infrared - electromagnetic energy with wavelengths of 8 to 14 micrometers

FASCAM - family of scatterable mines

FDC - fire direction center

FEBA - forward edge of the battle area

FFL - free fire line

flank wind - a wind that blows directly across a line between the smoke objective and the smoke source

FLIR - forward looking infrared

FLOT - forward line of own troops

fog oil - petroleum compounds of selected molecular weight and composition to facilitate formation of smoke by atomization or combustion; the resultant smoke is white

FS Cell - fire support cell

FSCOORD - fire support coordinator

FSE - forward security element

FSO - fire support officer

g - gram

gen - generator

GS - general support

GSR - ground surveillance radar

G/VLLD - ground/vehicle laser locator designator

haze - a light concentration of obscuration that restricts accurate enemy observation from the air and ground. This prevents accurate enemy target acquisition but does not disrupt friendly operations that require limited visibility such as river crossings. A smoke haze allows limited visibility that reduces the recognition of personnel and equipment from 50 to 150 meters.

HC - a pyrotechnic smoke-producing composition of hexachloroethane zinc oxide and aluminum powder employed in certain smoke munitions; has a sharp acid odor; toxic if released in sufficient quantities in enclosed places; the smoke is cool burning when contrasted to white phosphorus

HE - high explosive

HMMWV - high-mobility multipurpose wheeled vehicle

head wind - wind blowing away from the smoke objective and directly toward the smoke source

HUMINT - human intelligence

ICM - improved conventional munition

IFV - infantry fighting vehicle

IMINT - imagery intelligence

individual streamer - the initial phase of a smoke cloud before the streamers from the point sources merge

inversion - an increase of air temperature with increase in height (the ground being colder than the surrounding air); this condition usually occurs on clear or partially clear nights and early mornings until about one hour after sunrise but sometimes persists longer. When stable conditions exist there are no convection currents and with wind speeds below 5 knots little mechanical turbulence. Therefore stable conditions are the most favorable for ground-released smoke

IPB - intelligence preparation of the battlefield

IPE - individual protective equipment

ir - infrared

ITV - improved TOW vehicle

k - knot(s)

km - kilometer(s)

kmph - kilometer(s) per hour

lapse - a marked decrease of air temperature with increasing altitude (the ground being warmer than the surrounding air). During unstable or lapse conditions strong convection currents are found. For smoke operations the state is defined as unstable. This condition is normally the most unfavorable for the release of smoke.

LC - line of contact

LD - line of departure

LIC - low-intensity conflict

LOGPAC - logistics package

LRP - logistics release point

LTOE - living table of organization and equipment

m - meter(s)

marking smoke - smoke employed to relay prearranged communications on the battlefield. Frequently used to identify targets evacuation points and friendly unit perimeters.

MBA - main battle area

mech - mechanized

METT-T - mission enemy terrain troops and time available

mid-infrared - electromagnetic energy with wavelength in the range of 3 to 8 micrometers

min - minute(s)

mm - millimeter(s)

MOGAS - motor gasoline

MOUT - military operations on urbanized terrain

MRB - motorized rifle battalion

MRC - motorized rifle company

MSR - main supply route

MTOE - modified table of organization and equipment

multispectral obscurant - an obscurant that blocks or attenuates more than two portions of the electromagnetic spectrum (such as visual infrared and millimeter wave)

NAI - named areas of interest

NBC - nuclear biological and chemical

NBCC - nuclear biological and chemical center

NCO - noncommissioned officer

near infrared - electromagnetic energy with wavelengths of 07 to 3 micrometers

neutral - a meteorological condition that exists when conditions are intermediate between lapse and inversion; neutral conditions tending toward lapse favor production of smoke curtains; neutral conditions tending toward inversion favor smoke blankets or hazes

night-vision device - a viewer enabling an operator to see in the dark; also called night-observation device

NFL - no fire line

NTC - National Training Center

OB - order of battle

obj - objective

obscurant - a chemical compound that decreases the level of energy available for the functions of seekers trackers and vision-enhancement devices

obscuring smoke - smoke placed on or near enemy positions to minimize enemy observation both within and beyond the position area

oil smoke - see fog oil

OP - observation point

OPCON - operational control

OPLAN - operation plan

OPORD - operation order

OPSEC - operations security

PD - proximity detonator

phases of smoke - see individual streamer build-up phase uniform phase and terminal phase

PHOTINT - photographic intelligence

PIR - priority intelligence requirement

PL - phase line

plt - platoon

POL - petroleum oils and lubricants

protecting smoke - smoke produced to defeat or degrade target acquisition or guidance systems or the effects of directed-energy weapons

PWP - plasticized white phosphorus

quartering wind - a wind that blows between tail and flank winds toward the smoke objective

RAG - Regimental Artillery Group

rd - round

recon - reconnaissance

red phosphorus - a form of phosphorus not spontaneously flammable

RFL - restrictive fire line

RISTA - reconnaissance, intelligence, surveillance and target acquisition

RP - red phosphorus

RPV - remotely piloted vehicle

S1 - adjutant

S2 - intelligence officer

S3 - operations officer

S4 - logistics officer

S5 - civil-military affairs officer

screening smoke - smoke employed in areas of friendly operation or in areas between friendly and enemy forces to degrade enemy ground and aerial observation; used to conceal ground maneuver breaching and recovery operations as well as key assembly areas supply routes and logistic facilities

selected area - as used in this manual an area to be concealed by smoke

SG - smoke generator

SGF2 - smoke generator fog number 2; also called fog oil

signature - the visible or audible effects produced when firing a weapon or operating a piece of equipment such as smoke, noise, flame/heat or debris; also an electronic emission subject to detection and traceable to the equipment producing it

silhouette - the outline or general shape of something contrasted against a lighter background

SLAR - side-looking airborne radar

smoke - a particulate of solid or liquid part of low-vapor pressure that settles out slowly under gravity; in general smoke particles range downward from about 5 micrometers in diameter to less than 01 micrometer in diameter; also means the suspension of small liquid or solid particles in air; the filling for smoke munitions such as bombs shells and grenades; to produce signaling or screening smoke with any munition; generally any artificial aerosol

smoke blanket - a dense concentration of smoke established over and around friendly areas to protect them from visual observation from the air and visual precision bombing attack or established over an enemy area to protect attacking aircraft from air defense fire. Blankets can also be used at night to prevent enemy-observed air attack by flare light. A smoke blanket reduces visual recognition of personnel and equipment to less than 50 meters.

smoke control officer - the officer designated by the maneuver unit commander to coordinate and control the smoke operation

smoke curtain - a vertical development of smoke that reduces the enemy's ability to clearly see what is occurring on the other side of the cloud; visual recognition depends on the curtain width and smoke density

smoke generator - a mechanical device that vaporizes fog oil and releases it to condense in the air as a white smoke

smoke haze - a light concentration of smoke placed over friendly installations to restrict accurate enemy observation and fire but not dense enough to hamper friendly operations; density of haze is equivalent to that of light fog

smoke munition - a device that is either discharged from a weapon or thrown and that makes smoke

smoke point source - the point from which a smoke munition or smoke device generates an individual streamer of smoke

smoke position - location of a smoke pot or mechanical smoke generator

smoke pot - an expendable bucket- or pot-like ammunition that produces a dense smoke by burning a smoke mixture

smoke projectile - any projectile containing a smoke-producing agent that is released on impact or upon bursting; also called smoke shell

smoke shell - see smoke projectile

smoke target analysis - the process of selecting the optimal smoke delivery system to attack specific EO systems

smoke target development - the process of situation development and intelligence preparations of the battlefield

SOP - standing operating procedure

sophisticated weapons - precision-guided munitions equipped with infrared electro-optical or laser seekers/trackers with or without command links; munitions with high accuracy and hence high probability of kill against a target

special smoke - an obscurant that blocks or attenuates a specific portion of the electromagnetic spectrum (such as visual infrared and millimeter wave)

spt - support

sqd - squad

stable - see inversion

streamer - the smoke cloud formed by a single smoke source

synchronization - the coordination of activities in time space and purpose to achieve maximum combat power at the decisive point

TAA - tactical assembly area

TAACOM - theater Army area command

TAI - target areas of interest

tail wind - a wind that blows toward the smoke objective from behind the smoke source

temperature gradient - comparison of the air temperature at 5 meters above the ground with the air temperature at 4 meters above ground; see also inversion neutral and lapse

terminal phase - that stage of a smoke cloud when the cloud has thinned out and the cover is no longer effective; see also smoke blanket

thermal infrared - electromagnetic energy with a wavelength range of 3 to 20 micrometers

TOC - tactical operations center

TOE - table of organization and equipment

TOW - tube-launched optically tracked wire-guided

TPU - tank and pump unit

TVA - target value analysis

uniform phase - phase of smoke during which the uniformly obscuring cloud exists,the streamers have joined and breakup of the cloud has not begun

unstable - see lapse

UTM - universal transverse mercator

VEESS - vehicle engine exhaust smoke system

visibility - the distance at which it is possible to distinguish a prominent object against the background with the unaided eye

visibility criteria - the estimate of smoke effectiveness in qualitative terms (e.g., a haze means that you can see more than 50 but less than 150 meters into the smoke with the unaided eye).

visible spectrum - the portion of the electromagnetic spectrum lying between 0.38 and 0.78 micrometers

white phosphorus - a spontaneously flammable solid that burns to form solid smoke particles of phosphorus pentoxide; the phosphorus pentoxide then reacts with moisture in the atmosphere to form droplets of phosphoric acid; the dilution depends on the relative humidity

WP - white phosphorus

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